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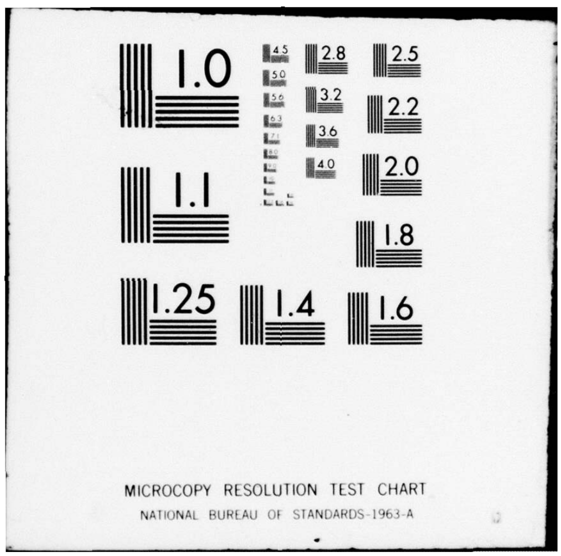
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DELAWARE RIVER BASIN
TRIBUTARY TO HAYNES CREEK
BURLINGTON COUNTY
NEW JERSEY

BREAKNECK DAM
NJ 00425

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

May, 1979

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Spillways	National Dam Inspection Act Report
Structural Analysis	Breakneck Dam, N.J.
Embankments	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-D

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

29 MAY 1979

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Breakneck Dam in Burlington County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Breakneck Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillways are considered inadequate since 63 percent of the Spillway Design Flood -SDF- would overtop the dam. The SDF, in this instance, is one half of the Probable Maximum Flood (PMF). To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillways and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be initiated to determine the dam's embankment condition and structural stability. This should include test borings to determine material properties relative to stability and seepage. A topographic survey of the dam and vicinity should be made. Any remedial measures found necessary should be initiated with calendar year 1980.

NAPEN-D
Honorable Brendan T. Byrne

c. The following remedial actions should be completed within six months from the date of approval of this report:

(1) All trees and brush on the earthfill embankment should be cut off at ground level and removed with minimal disturbance of the embankment surface.

(2) Eroded areas and bare areas should be filled and stabilized with ground cover vegetation. Positive drainage should be provided along the crest road.

(3) The submerged portions of the spillway and inaccessible portions of the discharge culverts should be inspected for distress and deterioration with the lake drawn down. Concrete surfaces should be repaired as necessary.

(4) Debris accumulated in the outlet works and around the spillways should be removed.

(5) Seepage areas should be monitored periodically so that the rate and source can be determined.

d. The owner of the dam should initiate a formal program of annual inspection and maintenance with special attention given to the culvert joint. The observations and measurements should be recorded on standardized checklist forms. Inspection checklists and complete records of maintenance should be included in a permanent file. Repairs should be performed as required and the following maintenance should be performed annually: remove brush and trees from the embankment, fill and stabilize eroded and bare areas, clear debris from the spillway openings and the downstream channel, point deteriorated sections of the brick arch discharge culvert and seal the joint between the culvert sections.

e. The lake should be drained at least once every five years to permit a complete inspection and repair of the dam and appurtenances.

f. The downstream toe of the embankment should be thoroughly inspected with the downstream lake level drawn down. This area should be thoroughly investigated for seepage and animal burrows, especially in the area of the corrugated metal pipe arch outfall and the undercut bank of the natural channels.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Edwin B. Forsythe of the Sixth District. Under the provisions of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
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Trenton, NJ 08625

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Trenton, NJ 08625

BREAKNECK DAM (NJ00425)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 19 December 1978 by Storch Engineers under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Breakneck Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillways are considered inadequate since 63 percent of the Spillway Design Flood -SDF- would overtop the dam. The SDF, in this instance, is one half of the Probable Maximum Flood (PMF). To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillways and to prevent overtopping should be initiated within calendar year 1980. In the interim, a detailed emergency operation plan and warning system, should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

b. Within six months from the date of approval of this report, engineering studies and analyses should be initiated to determine the dam's embankment condition and structural stability. This should include test borings to determine material properties relative to stability and seepage. A topographic survey of the dam and vicinity should be made. Any remedial measures found necessary should be initiated with calendar year 1980.

c. The following remdial actions should be completed within six months from the date of approval of this report:

(1) All trees and brush on the earthfill embankment should be cut off at ground level and removed with minimal disturbance of the embankment surface.

(2) Eroded areas and bare areas should be filled and stabilized with ground cover vegetation. Positive drainage should be provided along the crest road.

(3) The submerged portions of the spillway and inaccessible portions of the discharge culverts should be inspected for distress and deterioration with the lake drawn down. Concrete surfaces should be repaired as necessary.

(4) Debris accumulated in the outlet works and around the spillways should be removed.

(5) Seepage areas should be monitored periodically so that the rate and source can be determined.

d. The owner of the dam should initiate a formal program of annual inspection and maintenance with special attention given to the culvert joint. The observations and measurements should be recorded on standardized checklist forms. Inspection checklists and complete records of maintenance should be included in a permanent file. Repairs should be performed as required and the following maintenance should be performed annually: remove brush and trees from the embankment, fill and stabilize eroded and bare areas, clear debris from the spillway openings and the downstream channel, point deteriorated sections of the brick arch discharge culvert and seal the joint between the culvert sections.

e. The lake should be drained at least once every five years to permit a complete inspection and repair of the dam and appurtenances.

f. The downstream toe of the embankment should be thoroughly inspected with the downstream lake level drawn down. This area should be thoroughly investigated for seepage and animal burrows, especially in the area of the corrugated metal pipe arch outfall and the undercut bank of the natural channels.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 29 May 1979

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Breakneck Dam, I.D. NJ00425
State Located:	New Jersey
County Located:	Burlington
Drainage Basin:	Delaware River
Stream:	Tributary to Haynes Creek
Date of Inspection:	December 19, 1979

Assessment of General Condition of Dam

Breakneck Dam is in fair overall condition and outwardly structurally stable, however, the hydraulic capacity of the spillways are inadequate. The SDF (Spillway Design Flood) for Breakneck Dam is 1/2 PMF. The spillways at the dam are capable of passing about 31 percent of the PMF (62 percent of the SDF) without overtopping the dam.

The owner should engage a qualified professional engineer soon to perform more accurate hydraulic and hydrologic analyses of the spillways, the downstream channel and the contributing watershed. Based on the findings of these analyses, the dam and spillways should be modified to accommodate a storm equivalent to the SDF without an overtopping of the dam.

It is recommended that the following remedian measures be undertaken by the owner in the near future:

1. All trees and brush on the earthfill embankment should be cut off at ground level and removed with minimal disturbance of the embankment surface.
2. Eroded areas and bare areas should be filled and stabilized with ground cover vegetation in the near future. Positive drainage should be provided along the crest road.

3. The submerged portions of the spillway and inaccessible portions of the discharge culverts should be inspected for distress and deterioration with the lake drawn down.

   Concrete surfaces in the spillways should be sand blasted and coated with an epoxy sealant after all cracks are carefully inspected and pressure grouted.

4. Debris accumulated in the outlet works and around the spillways should be removed.

5. Seepage area should be monitored periodically so that the rate and source can be determined.

The owner of the dam should initiate a formal program of annual inspection and maintenance with special attention given to the culvert joint. The inspections should be performed by a qualified professional engineer and the observations and measurements should be recorded on standardized check-list forms. Inspection check-lists and complete records of maintenance should be included in a permanent file, available for public inspection.

Repairs should be performed as required and the following maintenance should be performed annually: remove brush and trees from the embankment, fill and stabilize eroded and bare areas, clear debris from the spillway openings and the downstream channel, point deteriorated sections of the brick arch discharge culvert and seal the joint between the culvert sections.

Furthermore, the lake should be drained at least once every five years to permit a complete inspection and repair of the dam and appurtenances.

A qualified professional engineer should be engaged in the near future to perform a comprehensive dam stability analysis with special attention given to the area along the corrugated metal pipe arch and the culvert joint. A Topographic survey, borings, test probes and seepage pressure evaluations should be performed as part of the stability analysis, and typical soil sections for the embankment should be developed along originally constructed areas, along the culverts, along areas that have undergone substantial filling since the 1940 repairs and along suspected seepage paths. Seepage and steepness of side slopes should be reviewed carefully with respect to the typical dam sections developed.

In addition, the downstream toe of the embankment should be thoroughly inspected with the downstream lake level drawn down. This area should be thoroughly investigated for seepage and animal burrows, especially in the area of the corrugated metal pipe arch outfall and the undercut bank of the natural channels.

Richard J McDermott

Richard J. McDermott, P.E.

OVERVIEW PHOTO - BREAKNECK DAM

19 DEC. 1978

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 30214. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

BREAKNECK DAM I.D. NJ00425

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

Breakneck Dam was inspected on December 19, 1978 to generally assess the structural integrity and operational adequacy of the dam and appurtenances.

1.2 Description of Project

a. Description of Dam and Appurtenances

The facilities at Breakneck Dam consist of an earthfill embankment with two concrete box drop inlet spillways. (see Plate 5, Overview Photo and Photos 1 and 3) The spillways discharge into culverts that pass through the embankment and outfall at the downstream toe of the embankment (see Photos 2 and 4).

The earthfill embankment is approximately 255 feet long and extends east/west. The embankment crest is 33 feet wide with an asphalt roadway at its center, about 21 feet wide (see Plate 8 and Photo 6). Based on field measurements, the upstream and downstream slopes are approximately 1:1 (see Photo 5). The embankment crest is generally level at elevation 55.8 (MSL) and the dam is about 14 feet high. Dense vegetation consisting of low level ground cover, brush and trees, covers both the upstream and downstream slopes of the embankment. The surface soil on the embankment consists mainly of sand.

The primary spillway is located about 90 feet west of the east end of the embankment. The spillway has a total crest length of 43 feet. The spillway crest is at elevation 51.0 and is about 4.8 feet below the dam crest.

The primary spillway structure consists of three reinforced concrete walls with spread footings set on 6 inch diameter timber piles 6 to 8 feet long. The downstream wall is formed by a rubble masonry headwall at the upstream end of the brick arch culvert. The center portion of the floor slab, between the wall footings is a separate member poured at grade with

eight 2-inch diameter weep holes to relieve uplift pressure. A timber tongue and groove sheet pile cutoff wall is located around the outside of the piles below the wall footings. A horizontal reinforced concrete strut is located at the downstream end of the structure between the tops of the two side walls to resist unbalanced hydrostatic thrust.

The primary spillway originally had one outlet works consisting of a 15" x 15" manual slide gate which reportedly has been replaced with a larger gate. The size of the replacement gate is uncertain.

The discharge culvert for the primary spillway consists of a brick arch extending through the embankment about two thirds of its width. At this point, the brick arch joins a corrugated metal pipe arch extension that continues through the embankment to a reinforced concrete headwall with wing walls at the downstream toe of the embankment.

The secondary spillway is located about 45 feet east of the west end of the embankment. The spillway has a total crest length of 14 feet, 2.5 feet controlled with timber stoplogs and 11.5 feet uncontrolled (inlet side walls). The normal stoplog crest is at elevation 50.6 and is about 5.2 feet below the dam crest. The inlet sidewall crest is at elevation 51.2 and is about 4.6 feet below the dam crest.

The secondary spillway structure consists of reinforced concrete side walls with slotted returns on the upstream face, where the timber stoplogs are fitted. The discharge culverts for the spillway consist of two 36-inch diameter corrugated metal pipes that outfall at the downstream embankment toe through a reinforced concrete headwall.

b. Location

Breakneck Dam impounds Taunton Lake and is located in the Township of Medford, Burlington County, New Jersey (see Plates 1 and 2). Discharge from Taunton Lake passes through the spillways at Breakneck Dam and along a short natural channel into Lake Pine, a tributary of Haynes Creek (See Plate 4). Taunton Lake is immediately downstream of Centennial Lake Dam. There are also a number of additional lakes with dams further upstream.

c. Size and Hazard Classification

Size and hazard classification criteria presented in "Recommended Guidelines for Safety Inspection of Dams," published by the U. S. Army Corps of Engineers are as follows:

SIZE CLASSIFICATION

	IMPOUNDMENT	
Category	Storage (Ac-Ft)	Height (Ft)
Small	<1000 and ≥ 50	<40 and ≥ 25
Intermediate	≥ 1000 and $<50{,}000$	≥ 40 and <100
Large	$\geq 50{,}000$	≥ 100

HAZARD POTENTIAL CLASSIFICATION

Category	Loss of Life (Extent of Development)	Economic Loss (Extent of Development)
Low	None expected (No permanent structures for human habitation	Minimal (Undeveloped to occasional structures or agriculture)

Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than few	Excessive (Extensive community, industry or agriculture)

The characteristics of Breakneck Dam are:

Storage = 354 acre-feet (at top of dam)
Height = 14 feet
Potential Loss of Life: Approroximately 15 residential dwellings in the downstream SDF flood plain along Lake Pine.

Potential Economic Loss: Flooding of residential development in the downstream area.

Therefore, Breakneck Dam is classified as "small" size with "high" hazard potential.

d. Ownership

Breakneck Dam is owned by the Taunton Lake Company, Taunton Lake, Marlton P.O., New Jersey 08053.

e. Purpose of the Dam

The purpose stated on the 1940 "Application for Permit for Repair or Construction of Dams" is Private Realestate Development. Now that the lake shore properties have been developed, the dam serves to impound a recreational lake.

f. Design and Construction History

Reportedly the original embankment and spillway were constructed around 1870. The earthfill embankment and the brick arch culvert basically have remained unchanged since the original construction. The spillway was originally a timber frame structure with timber stoplogs.

In September 1940, the dam was breached and a substantial portion of the embankment was lost, but the brick arch culvert remained intact. Reports of damage in the downstream area were not available. Repairs were designed and implemented. The breach was filled and a new reinforced concrete box drop inlet spillway was constructed at the upstream end of the brick arch. The contractor was reportedly Hill Construction Company of Mount Holly, New Jersey.

Since the 1940 repair work, there have been two major changes in the facility. A corrugated metal pipe arch and concrete headwall were added to the downstream end of the brick arch and a secondary spillway consisting of a reinforced concrete drop inlet with two 36-inch diameter discharge culverts and downstream concrete headwall were constructed.

g. Normal Operational Procedure

The operation of the spillway facilities at Breakneck Dam is coordinated by and for the most part performed by the Civil Defense Director of the Township of Medford.

Maintenance of Breakneck Dam is usually performed "as-needed" by the Burlington County Road Department or the Township of Medford, in cooperation with the owner. Regular maintenance

consists of the following: 1) lowering the water level each spring to permit repair of docks, cleaning of beaches and inspection and repair of the dam and appurtenances. Occasionally fill and sod are placed on the embankment slopes to restore and stabilize eroded areas.

1.3 Pertinent Data

a. Drainage Area - 13.0 square miles

b. Discharge at Damsite

Maximum known flood at damsite	Dam breached in 1940
Outlet works at normal pool elevation	22 cfs
Diversion tunnel low pool outlet at pool elevation	N.A.
Diversion tunnel outlet at pool elevation	N.A.
Gated spillway capacity at normal pool elevation	2 cfs
Gated spillway capacity at top of dam (Secondary)	196 cfs
Ungated spillway capacity at top of dam (Primary)	1102 cfs
Total spillway capacity at top of dam	1298 cfs

c. Elevation (Feet above MSL)

Top of Dam	55.8
Maximum pool-design surcharge	57.4
Full flood control pool	N.A.

Recreation pool	51.0
Spillway crest	51.0
Upstream portal invert diversion tunnel	N.A.
Stream bed at centerline of dam	41.6
Maximum tailwater	50.0 (Estimated)

d. Reservoir

Length of maximum pool	4100 feet
Length of recreation pool	4200 feet
Length of flood control pool	N.A.

e. Storage (Acre-feet)

Recreation pool	125 acre-feet
Flood control pool	N.A.
Design surcharge	451 acre-feet
Top of dam	354 acre-feet

f. Reservoir Surface (Acres)

Top of dam	60 acres (estimated)
Maximum pool	67 acres (estimated)
Flood control pool	N.A.
Recreation pool	39 acres
Spillway crest	39 acres

g. Dam

Type	Earthfill
Length	255 feet
Height	14 feet

Sideslopes - Upstream	1 horiz. to 1 vert.
- Downstream	1 horiz. to 1 vert.
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

h. Diversion and Regulating Tunnel N.A.

i. Primary Spillway

Type	Drop Inlet
Length of weir	43 feet
Crest elevation	51.0
Gate	Manual Slide Gate, 15" x 15"
Upstream channel	N.A.
Downstream channel	Discharge culvert (Brick arch and CMPA)

j. Secondary Spillway

Type	Drop Inlet
Length of weir	14.0 feet
Crest elevation	50.6 feet (Stoplogs) 51.2 feet (Concrete Walls)
Gate	None
Upstream	N.A.
Downstream	Discharge culvert (2-36" diameter CMP's)

k. Regulating Outlets

Manual slide gate	Gate opening 15" x 15" in Primary Spillway. Reportedly replaced with larger gate, however no size information available.

SECTION 2: ENGINEERING DATA

2.1 Design

Neither plans nor calculations are available for the original construction of Breakneck Dam or appurtenances. Design calculations and a construction plan for the hydraulic capacity, structure and foundation of the primary spillway prepared in 1940 are contained in the NJDEP file.

Neither plans nor calculations are available for either the secondary spillway or the corrugated metal pipe arch extension of the primary spillway discharge culvert.

2.2 Construction

There are no records available in the NJDEP file for the original construction of the dam.

Five dam inspection reports in the NJDEP file, deal with repair of the dam after it was breached in September 1940. A summary of these reports follows:

Report dated September 4, 1940:
Prepared by J. C. King, N.J. State Water Policy Commission (NJSWPC)
Breach caused by storm of September 1, 1940, verified.

Report dated September 26, 1940:
Prepared by J. M. Brooks, NJSWPC
Exposed brick arch culvert inspected and found to be in good condition and adequate for reuse in repair of dam.

Report dated December 26, 1940:
Prepared by J. C. King, NJSWPC
Footings for primary spillway completed. Breach filled to about halfway from west end of the opening.
A large gate valve was recommended, 24" x 24".

Report dated January 8, 1941:
Prepared by J. C. King, NJSWPC
Reinforcing revisions in the drop inlet walls and the horizontal strut were agreed upon.

Report dated February 7, 1941:
Prepared by J. C. King, NJSWPC
Primary spillway construction completed. Upstream brick arch headwall was cut down to match the top of the spillway. As-built spillway crest length was longer than approved, therefore, the required operating head and consequently the elevation of the dam crest were reduced. Pointing of stone work in the brick arch, filling of the washout and turfing of the embankment slopes were completed in accordance with the drawings. Acceptance of the repair work was recommended.

There are no records available in the NJDEP file for the construction of the secondary spillway or the corrugated metal pipe arch extension of the primary spillway discharge culvert.

2.3 Operation

No formal records of the operation of the dam have been kept by the owner.

Generally the lake is drawn down a few feet in early spring each year to permit shoreline residents to repair docks and clean beaches. Periodically the lake is completely drawndown to facilitate inspection of the dam and appurtenances.

Reportedly, complete drawdown of the lake takes about one day.

The lake level is monitored periodically. The slide gate on the primary spillway and the stoplogs on the secondary spillway are adjusted so as to maintain the desired water level in the lake. The lake is usually lowered about 6 inches in anticipation of intense storms.

In January 1971, the owner of the dam, Taunton Lake Company engaged Theodore A. Shaw, PE to perform an "Annual Inspection" of the dam. This report is contained in the NJDEP file. The dam was reported to have been generally in good condition. Repairs were suggested, consisting of: 1) Placing riprap beneath the secondary spillway outlet, 2) inspecting and pointing the interior of the brick arch.

2.4 Evaluation

a. Availability

Engineering information for the original dam, the secondary spillway and the corrugated metal pipe arch extension of the discharge culvert is not available.

Hydraulic and structural calculations and construction drawings for the primary spillway structure are available from the NJDEP file. Inspection reports for the dam, prepared by NJSWPC describing conditions at the dam during the period from the breach in 1940 to completion of repairs in 1941 are also in the NJDEP file. This information is available for inspection at the offices of the Bureau of Flood Plain Management, 1474 Prospect Street, Trenton, N. J.

b. Adequacy

Engineering data available in the NJDEP file are adequate to permit an assessment of the hydraulic capacity of the primary spillway, but are not of significant value in performing a hydraulic capacity of the secondary spillway nor the structural stability of the dam and the primary spillway.

c. Validity

Based on the findings of the field inspection, the information contained in the NJDEP file for Breakneck Dam is essentially accurate with respect to the as-built conditions at the site.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

Breakneck Dam was inspected on December 19, 1978 by members of the staff of Storch Engineers. A copy of the visual inspection check list is contained in Appendix 1. The following procedures were employed for the inspection:

1. The embankment of the dam, appurtenant structures and adjacent areas were examined.
2. Areas of suspected seepage were noted and located.
3. The embankment and accessible appurtenant structures were measured and key elevations were determined by hand level.
4. The embankment and appurtenant structures and adjacent areas were photographed.

Information presented in the following portions of this Section consists of observations made during the field inspection.

b. Dam

The embankment crest was generally level with a straight horizontal alignment leading to a slight northward curve at the east end. The paved crest road and adjoining areas were in good condition with slight erosion along the top of the side slopes from poor road drainage.

Most of the upstream and downstream slopes were covered with extensive tree and brush growth, and sparse grass. One area of significant road drainage related erosion was located on

the downstream slope, adjacent to the primary spillway discharge culvert. Minor erosion was noted in several other areas along both side slopes.

A stilling basin was observed at the outfall of the secondary spillway discharge culvert. The west bank of the natural channel downstream of this outfall has been undercut and eroded. Seepage was noted exiting from the undercut area (see Plate 5 and Photo 9) discharging as a trickle with some suspended orange silt.

No evidence of cracking, settling or animal burrows was noted along the embankment.

Generally, soils at the dam site are composed of unconsolidated stratified silty sand and narrowly graded sand of marine origin. These deposits, known as Kirkwood Sands, were formed during the Tertiary Period and extend for a considerable depth. The lake basin contains significant surficial organic matter, silt and sand with some clay. Bedrock is more than 100 feet below the surface.

c. Appurtenant Structures

Spillways

The exposed portions of both concrete spillways generally were in good condition with exposed aggregate on the concrete surfaces. The submerged and buried portions were not inspected.

The tops of both spillways were open and readily accessible, constituting a serious physical safety hazard.

Outlet Works

The outlet works for the dam consisting of a manual slide gate is located on the south wall of the primary spillway in the southwest corner of the structure. Discharge from the slide gate passes directly into the spillway. The gate wheel is accessed by a steel frame and timber plank walkway.

The upper portion of the slide gate mechanism, consisting of the gate wheel and stem, was in good condition. The gate was submerged and could not be inspected. At the time of the inspection the gate was closed.

Discharge Culverts

The discharge culvert for the primary spillway consists of a brick arch, 13.8 feet wide and 7.8 feet high (upstream) and a corrugated metal pipe arch (downstream). This culvert was apparently in fair condition. The interior of the culvert could not be inspected in detail because it was not accessable. Mortar was missing from brick joints at the upstream end of the culvert. The downstream concrete headwall was in good condition. The discharge culvert of the secondary spillway, consists of two 36-inch diameter corrugated metal pipes, which were apparently in good condition. Both the upstream and downstream concrete headwalls were in good condition. At the downstream end of the culvert there is a stilling basin with the remains of a riprap apron along the perimeter of the basin, which apparently has been scoured away.

d. Reservoir Area

Taunton Lake is about 4100 feet long and varies in width from about 200 feet to about 500 feet.

The immediate shore line contains residential development. The area surrounding the lake slopes gradually upward away from the lake at slopes of between 3% and 10% in the immediate shoreline area. Numerous docks and several small coummunity beaches were observed along the shoreline.

e. Downstream Channel

The downstream channel at Breakneck Dam consists of two natural streams which join a short distance downstream and have no significant obstructions. Both natural channels share the same flood plain, which is flat and broad with substantial vegetation in the form of trees and brush.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The water level in Taunton Lake is normally naturally controlled by overflow through the spillways. The lake level is lowered several inches in anticipation of intense storms by Township of Medford officials. During these periods the lake level is observed frequently and stoplogs on the secondary spillway and the gate on the primary spillway are used to augment outflow. These activities are coordinated with upstream and downstream lakes so as to accommodate high discharges from one lake to another.

4.2 Maintenance of the Dam

There is no regular maintenance or inspection procedures for the dam and appurtenances. Maintenance is performed "as-needed" by the Burlington County Road Department and the Township of Medford in cooperation with the owner. Overall conditions at the dam are observed by local officials at least weekly. Occasional comprehensive inspections are made during periods when the lake is completely drawn down.

There has been no maintenance documentation for the dam. However, verbal accounts indicate almost annual repairs to the crest road and side slopes consisting of filling of road drainage related erosion, and placing of sod on the side slopes.

Past experience has shown that the joint between the brick arch culvert and corrugated metal pipe arch is an area of potential weakness. Differential movement and loss of soil from above the culvert has been experienced and large holes in the embankment

crest and the road have developed. Repairs have consisted of patching the joint with mortar and filling holes and depressions with locally available soil.

Judging from the present condition of the dam, maintenance has been adequate.

4.3 Maintenance of Operating Facilities

Maintenance records for the spillways are not available. Reportedly the spillways have not been maintained recently. Occasionally stoplogs in the secondary spillway are replaced and the manual slide gate in the primary spillway is serviced. Reportedly the existing slide gate in the primary spillway is larger than the 15" x 15" gate indicated on the 1940 repair drawings. However, there is no record of the replacement of the gate nor the size of the new gate.

Maintenance records for the discharge culverts are poor. The NJDEP file indicates one formal inspection by T. A. Shaw, PE and subsequent recommendation consisting of constructing a riprap apron at the outfall of the secondary spillway and pointing the brick arch.

4.4 Description of Warning System

The warning system for Breakneck Dam consists of frequent observation of the lake level by the Civil Defense Director, as often as hourly during intensive storms and close coordination with upstream and downstream dams. This procedure is not written, but has been established through long past experience of municipal officials.

The system was found to be inadequate at one time in the recent past. In 1958 an intense storm caused the dam at Marlton Lakes

(upstream) to breach. This dam is not in the Township of Medford and is not monitored by the above system. The breach outflow from Marlton Lakes caused dams at Packowango, the Girl Scout Camp and Bradocks Mill to breach. The flood flow was contained at Centennial Lake Dam immediately upstream of Taunton Lake.

4.5 Evaluation of Operational Adequacy

The dam and appurtenances at Breakneck Dam have performed satisfactorily since the 1940 repair with no overtopping nor breaching.

There has been poor maintenance documentation, although maintenance apparently has been adequate to sustain the earthfill embankment and appurtenances.

The informal warning system that has been developed over the years has served adequately since 1958. However, it probably would not be adequate, should the SDF for Breakneck Dam occur.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

Size and hazard classification were used in conjunction with "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers to establish the SDF (Spillway Design Flood) for Breakneck Dam. The appropriate design range for this facility is 1/2 PMF to PMF (Probable Maximum Flood). Since the characteristics of Breakneck Dam as described in Section 1, fall into the lower end of the prescribed classification range, 1/2 PMF is used as the SDF.

The inflow hydrograph consists of a combination of runoff from the 5.7 square mile drainage area that inflows directly into Taunton Lake and the outflow hydrograph for Centennial Lake Dam immediately upstream (see HEC-1-DB Computations, Appendix 4). It has been assumed for this analysis that the SDF for Breakneck Dam would not breach Centennial Lake Dam. Therefore, discharge into Taunton Lake from Centennial Lake Dam would consist of spillway discharge and overtopping of Centennial Lake Dam.

Clark's Method with a synthetic time-area curve was used to analyze the drainage areas. General hydrologic characteristics such as: Drainage Area (DA), Surface Storage Index (S_t), Main Channel Slope (S) and Man-made Impervious Cover Index (I) were computed using USGS quadrangles and aerial photographs. These data were used in conjunction with the following equations to determine the Clark's Method Parameters (R and Tc):

$$R/Tc + R = 0.76$$

$$Tc + R = (DA/S)^{0.22} \quad (S_t)^{0.35} \quad (1 + 0.3I)^{-0.28}$$

The total drainage area contributing to Taunton Lake is 13 square miles. Most of the watershed is undeveloped woodland and swamp with considerable residential development along the shoreline. Reservoir storage capacities were estimated using available data and surface areas measured from USGS quadrangles.

Discharge hydraulics for Breakneck Dam were established by evaluating the spillway crest lengths as a sharp-crested weir.

The SDF inflow hydrograph for Breakneck was routed through the spillways using the HEC-1-DB Computer Program, which indicated that the dam would be overtopped. Based on the depth of overtopping that would develop, it is probable that the dam would be breached. Computations show that overtopping in a non-breach condition would occur for about 25 hours with a maximum flow height of 1.58 feet above the dam crest and a maximum discharge of about 2772 cfs. It was also calculated that the existing spillways are adequate for a maximum flow of about 31 percent of the PMF without overtopping the dam (62 percent of the SDF).

The SDF routing discussed above does not include discharge through the slide gate or the stoplog controlled opening. The added use of these facilities would not alleviate overtopping potential.

b. Experience Data

Reportedly, Breakneck Dam has not been overtopped or breached since repairs were effected after the September 1940 washout.

Municipal Officials in the Township of Medford reportedly maintain vigilant monitoring of water surfaces in the township

during storm periods and control spillway facilities through declared emergencies. In 1958 four upstream dams were breached when the Marlton Lakes Dam breached. The progressive failure was halted at Centennial Lake Dam through careful use of the spillway and outlet works.

c. Visual Observation

At the time of the field inspection there was no evidence of past overtopping. Eroded areas were noted on the embankment side slopes which were apparently due to poor crest road drainage.

Based on field measurements the primary spillway is essentially as indicated on the drawings in the NJDEP file. The secondary spillway and the discharge culverts were measured to permit evaluation of discharge capacities.

d. Overtopping Potential

As noted above, the SDF for Breakneck Dam would result in overtopping of the dam for about 25 hours with a maximum flow height of 1.58 feet in a non-breach condition. Further calculations indicate that storms greater than 31 percent of the PMF would result in overtopping of the dam.

Considering the type of construction (earthfill embankment) and the magnitude of overtopping that would be associated with the SDF, the dam would probably be breached.

Projected breach conditions for Breakneck Dam were analyzed with the HEC-1-DB computer program. It was assumed that a breach would result in the loss of about 40 percent of the

dam crest length and would take about one hour to develop.

The tailwater conditions in Lake Pine (downstream) would limit the breach depth. It was estimated that the minimum bottom elevation of the breach would be about elevation 46.0. The peak breach discharge would be approximately 5717 cfs. The Breakneck Dam breach condition would result in a downstream SDF stage about 2.1 feet above the non-breach stage. This additional rise would occur over a period of about 1.5 hours and probably would not result in a significant increase in the potential for loss of life in the downstream area.

It should be noted that this analysis does not consider the breaching of Centennial Lake Dam (upstream) under SDF conditions, which is probable and would adversely effect Breakneck Dam.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation

At the time of the field inspection, there were no signs of distress or subsidence in the dam or the spillways. Seepage was observed about 12 feet downstream of the embankment toe on the west side of the secondary spillway outfall along an undercut portion of the bank. Seepage flowed as a trickle with suspended orange silt. A small stilling basin has developed downstream from the secondary spillway outfall. Serious erosion was observed on the downstream slope along the primary spillway discharge culvert.

The spillways and dicharge culverts were generally in good condition. Submerged and buried portions could not be observed nor could the inside of the discharge culverts. Considerable growth in the form of trees, brush and sparse grass was present on the embankment side slopes.

b. Design and Construction Data

Structural calculations and design drawings for the primary spillway are available from the NJDEP file. However, there is not sufficient data with respect to foundation soils and reinforcing steel to permit an evaluation of the design. Superficially the primary spillway appears to be stable, since it has performed satisfactorily since 1940 under various dynamic loading cycles without noticable distress.

There are no structural design calculations nor typical sections for the embankment on file. Filling of holes that have developed in the embankment above the primary discharge culvert has substantially altered the embankment.

c. Operating Records

No formal records are available. Reportedly the dam has served adequately with no significant evidence of structural instability since the 1940 repair work was completed. Eroded areas along the embankment slopes are filled and sodded on an almost annual basis.

Past experience indicates that the joint between the brick arch and the corrugated metal pipe arch culvert section downstream from the primary spillway has suffered limited differential movement and loss of soil from above the joint.

The headwall at the secondary spillway outfall is occasionally undercut slightly by the stilling basin at the embankment toe. Riprap was placed in this area pursuant to the 1971 annual inspection recommendations by T. A. Shaw, PE

d. Post Construction Changes

There is no record of changes after the 1940 repair construction. However, field inspection indicated several changes: 1) a secondary spillway and discharge culvert has been added, 2) the discharge culvert for the primary spillway and the embankment have been extended, 3) a concrete headwall has been constructed recently at the downstream end of the primary spillway discharge culvert and 4) embankment slopes have been steepened by periodic filling and repair.

e. Seismic Stability

Breakneck Dam is located in Seismic Zone 1 as is defined in "Recommended Guidelines for Safety Inspection of Dams," which is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions, if stable under static loading conditions. Breakneck Dam appears to be stable under static loading based on the field inspection observations.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on the hydraulic and hydrologic analyses described in Section 5: Hydraulic/Hydrologic and Appendix 4 the spillways are capable of accommodating about 31 percent of the PMF (62 percent of the SDF) without overtopping the dam. This flow is dependent on the intact retention capacity of Centennial Lake Dam (upstream). The hazard classification of the dam is "High". A storm of magnitude equivalent to the SDF (1/2 PMF) would overtop and probably cause the dam to fail. The breaching of Breakneck Dam would result in a maximum SDF stage in Lake Pine (downstream) about 2.1 feet above the non-breach SDF stage, and probable would not significantly increase the potential for loss of life in the downstream area. It is therefore concluded that Breakneck Dam spillways are inadequate.

Outwardly, the structural integrity of the dam appears to be adequate based on the field inspection, however sufficient data is not available to permit a complete assessment of the present structural condition of the dam and appurtenances. Reportedly, the joint between the brick arch and the corrugated metal arch has experienced differential movement and loss of soil from above, and is therefore an area of potential weakness.

b. Adequacy of Information

Information sources for this study include: 1) field investigations, 2) 1940 repair design calculations, construction drawings, "Application for Permit for Construction or Repair of Dam", dam inspection reports and miscellaneous correspondence

in the NJDEP file, 3) USGS quadrangles, 4) aerial photographs from Burlington County and 6) consultation with local municipal officials.

Information and data collected for Breakneck Dam is sufficient to permit a Phase I assessment of the dam with respect to spillway adequacy and outward structural stability.

c. Necessity for Additional Data/Evaluation

Additional information in the form of a comprehensive topographic survey, borings, probes and seepage pressure analyses should be obtained, together with seepage observations along the downstream toe of the dam, to permit an accurate analysis of dam stability, subsequent to the issuance of this report.

7.2 Recommendations

a. Remedial Measures

It is recommended that the following remedial measures be undertaken by the owner in the near future:

1. All trees and brush on the earthfill embankment should be cut off at ground level and removed with minimal disturbance of the embankment surface.
2. Eroded areas and bare areas should be filled and stabilized with ground cover vegetation in the near future. Positive drainage should be provided along the crest road.
3. The submerged portions of the spillway and inaccessible portions of the discharge culverts should be inspected for distress and deterioration with the lake drawn down.

Concrete surfaces in the spillways should be sand blasted and coated with an epoxy sealant after all cracks are carefully inspected and pressure grouted.

4. Debris accumulated in the outlet works and around the spillways should be removed.
5. Seepage area should be monitored periodically so that the rate and source can be determined.

b. Maintenance

The owner of the dam should initiate a formal program of annual inspection and maintenance with special attention given to the culvert joint. The inspections should be performed by a qualified professional engineer and the observations and measurements should be recorded on standardized check-list forms. Inspection check-lists and complete records of maintenance should be included in a permanent file, available for public inspection.

Repairs should be performed as required and the following maintenance should be performed annually: remove brush and trees from the embankment, fill and stabilize eroded and bare areas, clear debris from the spillway openings and the downstream channel, point deteriorated sections of the brick arch discharge culvert and seal the joint between the culvert sections.

Furthermore, the lake should be drained at least once every five years to permit a complete inspection and repair of the dam and appurtenances.

c. Additional Studies

A qualified professional engineer should be engaged in the near future to perform a comprehensive dam stability analysis

with special attention given to the area along the corrugated metal pipe arch and the culvert joint. A topographic survey, borings, test probes and seepage pressure evaluations should be performed as part of the stability analysis, and typical soil sections for the embankment should be developed along originally constructed areas, along the culverts, along areas that have undergone substantial filling since the 1940 repairs and along suspected seepage paths. Seepage and steepness of side slopes should be reviewed carefully with respect to the typical dam sections developed.

In addition, the downstream toe of the embankment should be thoroughly inspected with the downstream lake level drawn down. This area should be thoroughly investigated for seepage and animal burrows, especially in the area of the corrugated metal pipe arch outfall and the undercut bank of the natural channels.

The owner should engage a qualified professional engineer soon to perform a more sophisticated hydraulic and hydrologic analyses of the spillways, the downstream channel and the contributing watershed. Based on the findings of these analyses, the dam and spillways should be modified to accommodate a storm equivalent to the SDF without overtopping.

PLATES

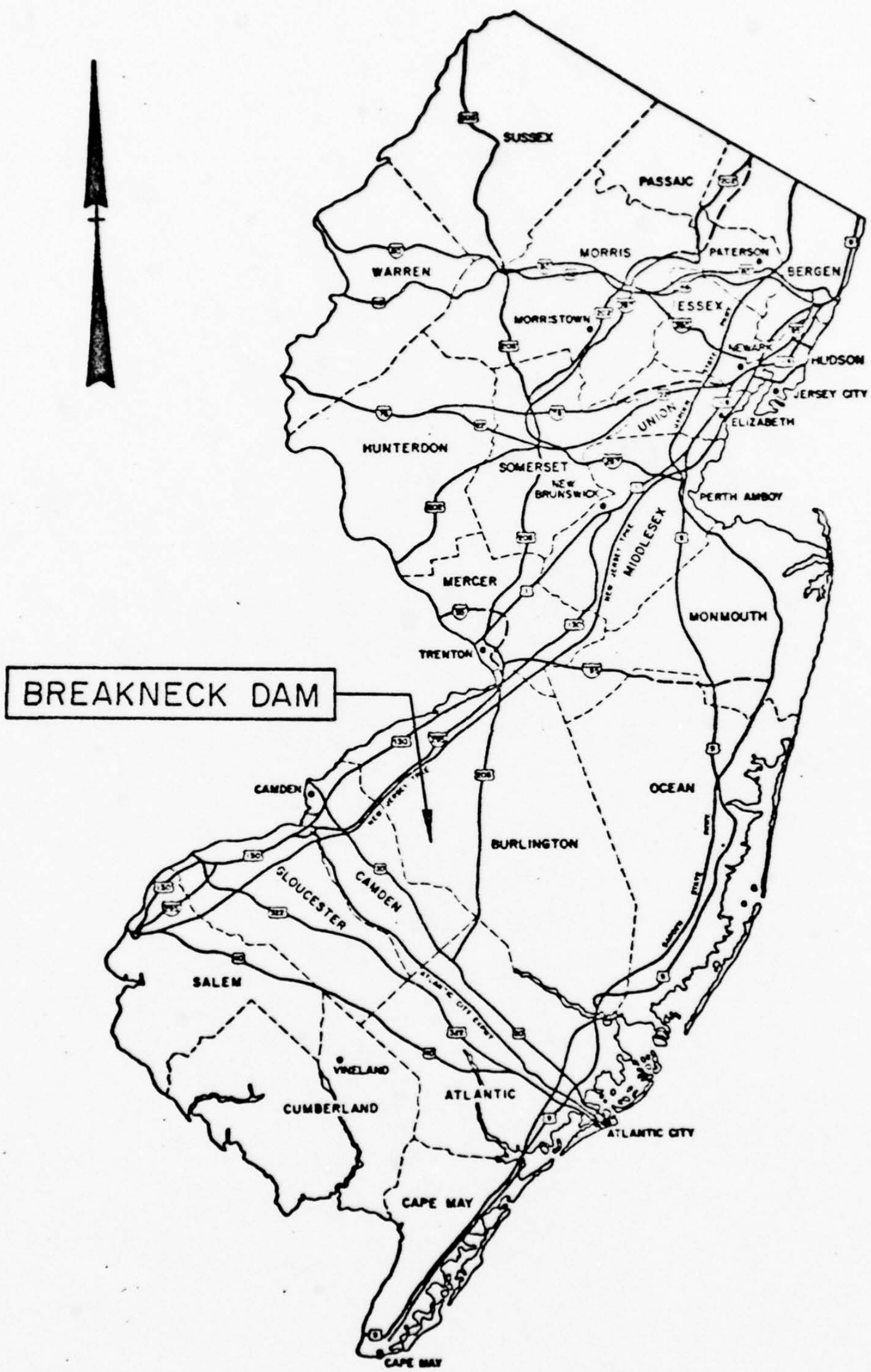


PLATE I

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS **KEY MAP** BREAKNECK DAM	
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00425	SCALE: NONE
		DATE: FEBRUARY, 1979

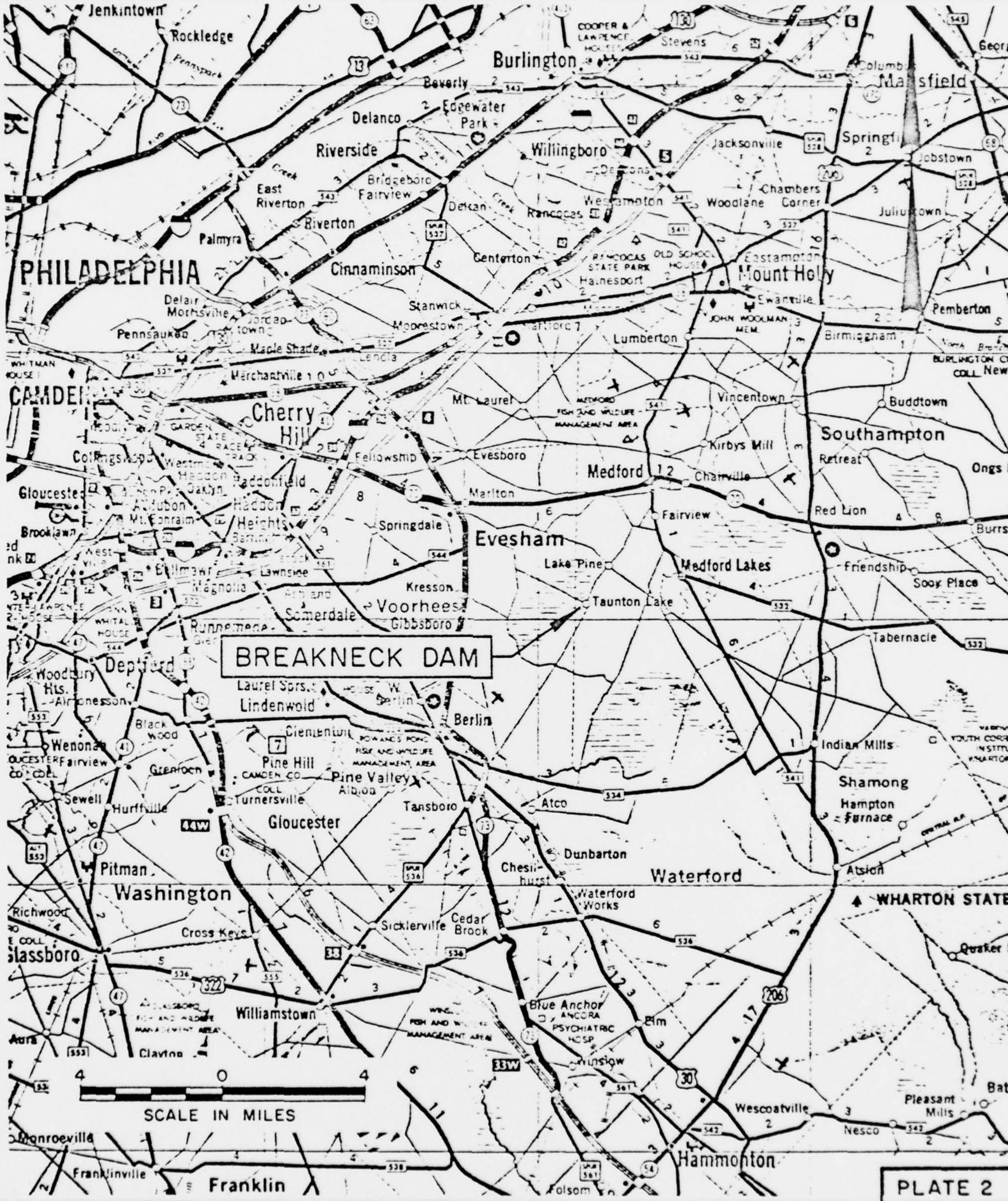
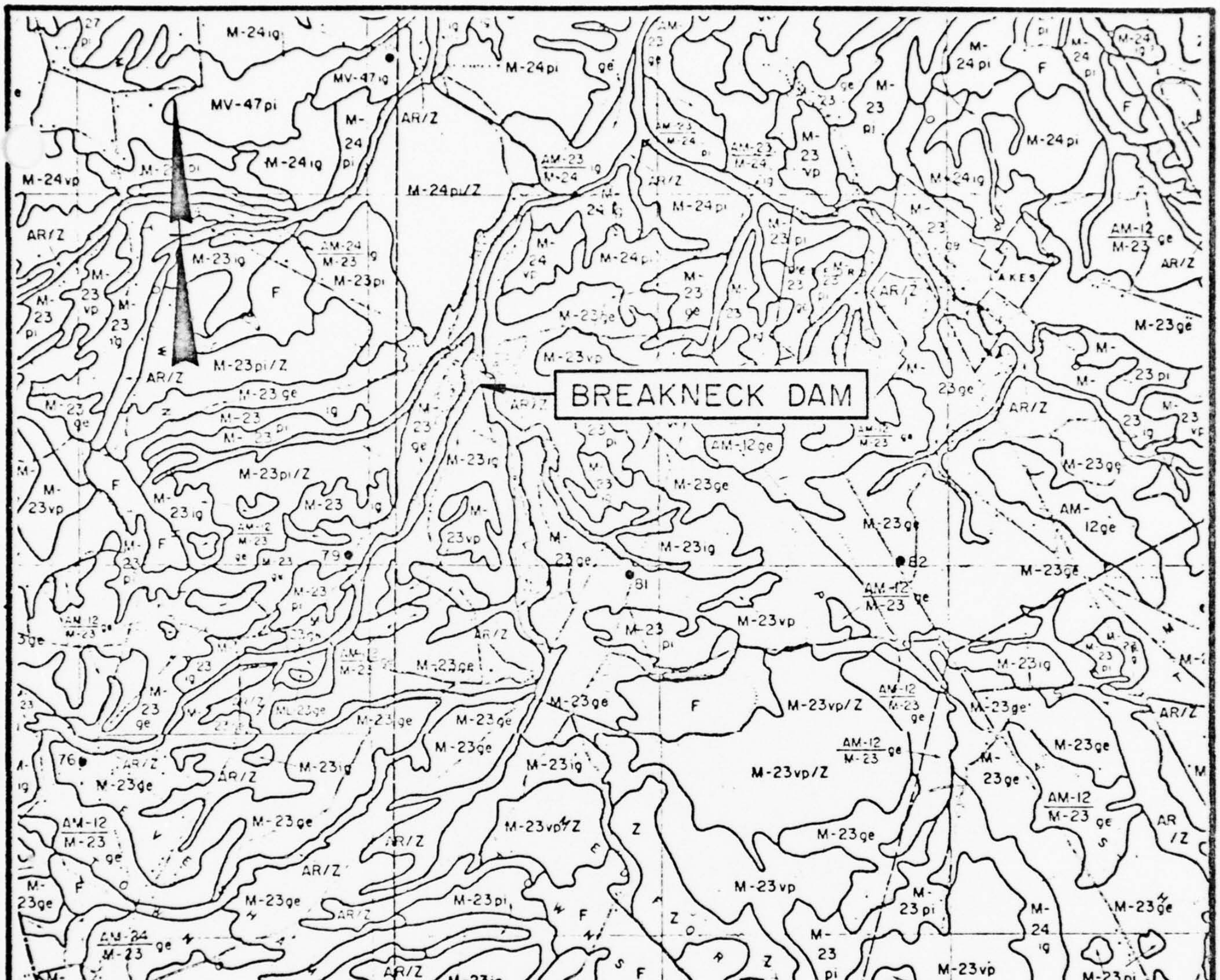


PLATE 2

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS **VICINITY MAP** BREAKNECK DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00425 — SCALE: AS SHOWN DATE: FEBRUARY, 1979



Legend

M-23 Unconsolidated stratified silty sand and narrowly graded sand of marine origin (Kirkwood Sands).

AR/Z Silt and sand, with some clay and significant organic matter near the surface.

Note

Information taken from Rutgers University Soil Survey of New Jersey, Report No. 20 Burlington County and Geologic Map of New Jersey prepared by Lewis and Kummel.

PLATE 3

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS **SOIL MAP** BREAKNECK DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00425 — SCALE: NONE DATE: FEBRUARY, 1979

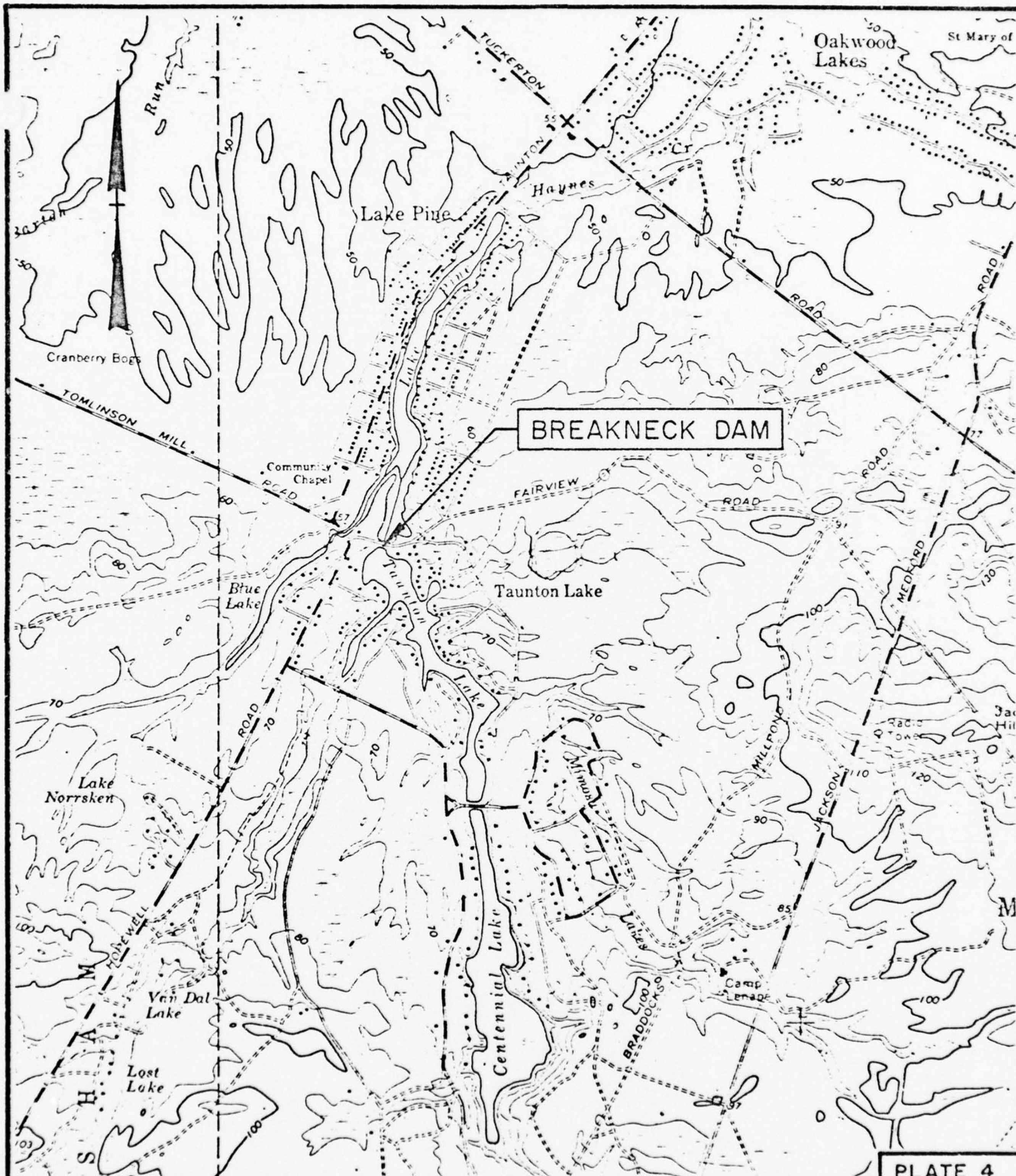
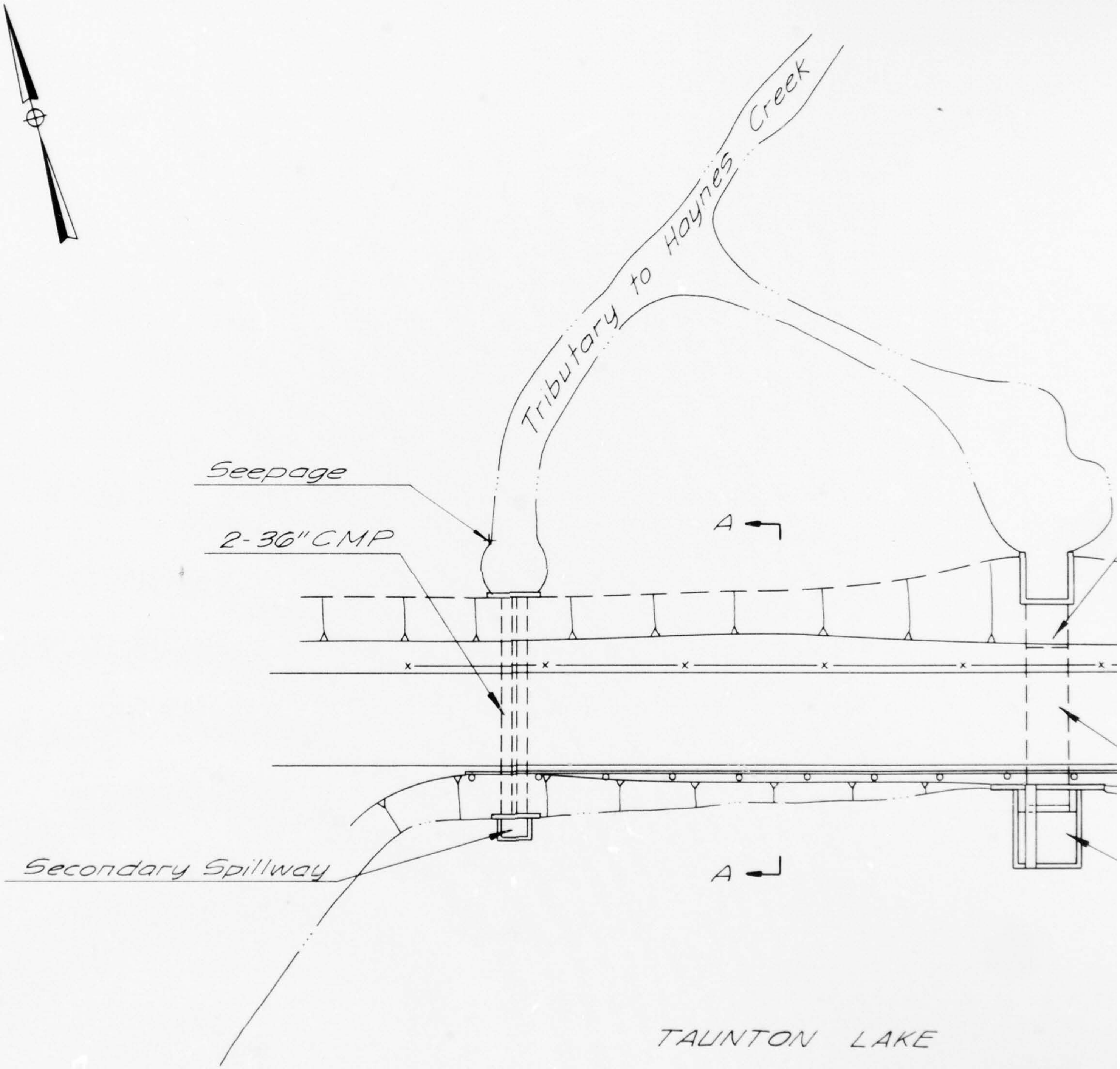


PLATE 4

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS TOPOGRAPHICAL MAP BREAKNECK DAM	
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00425	SCALE: NONE
		DATE: MARCH, 1979



NOTE:
Information taken from updated plan
by Albert C. Jones prepared in or prior to 1940
and from field inspection December 19, 1978.

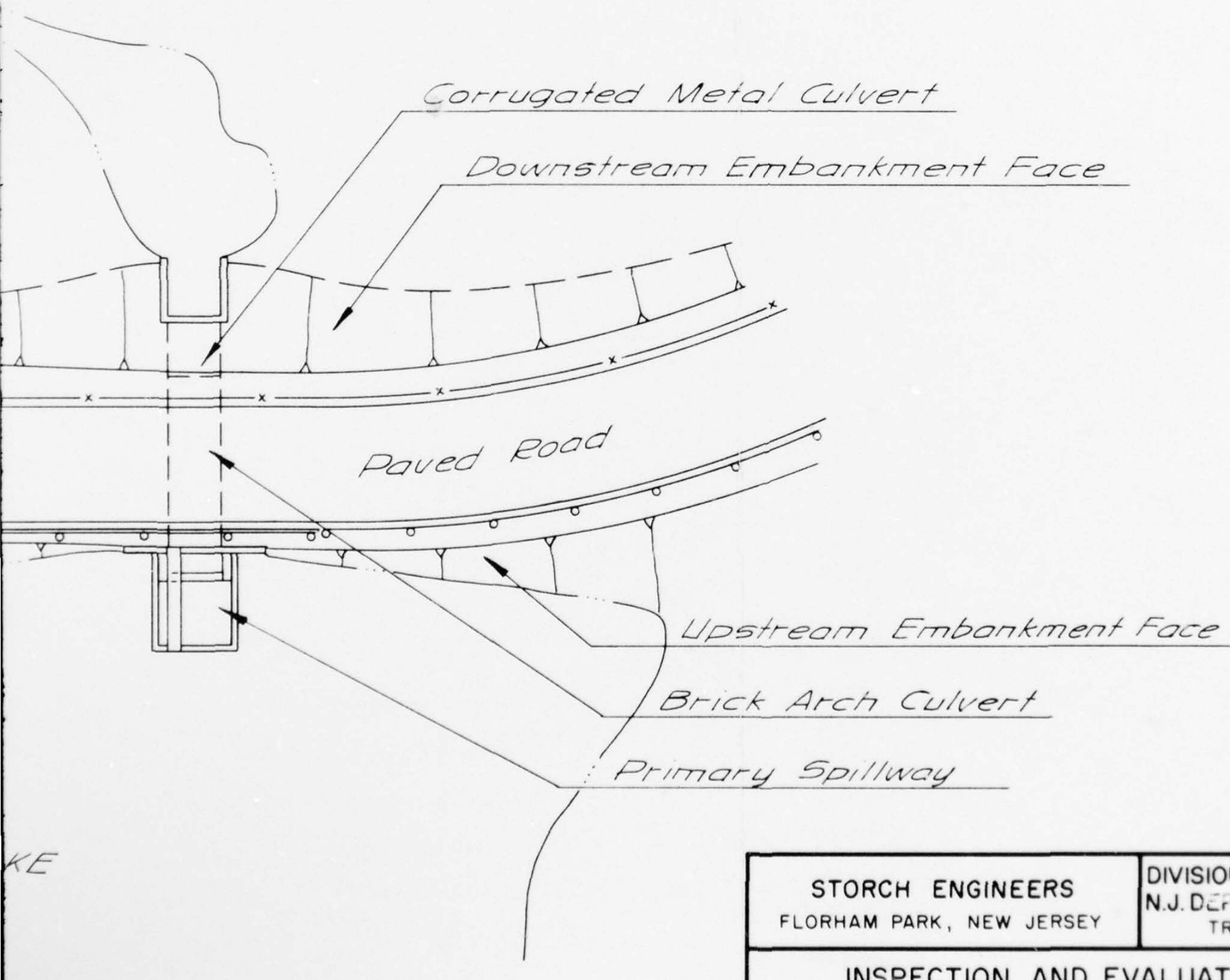


PLATE 5

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

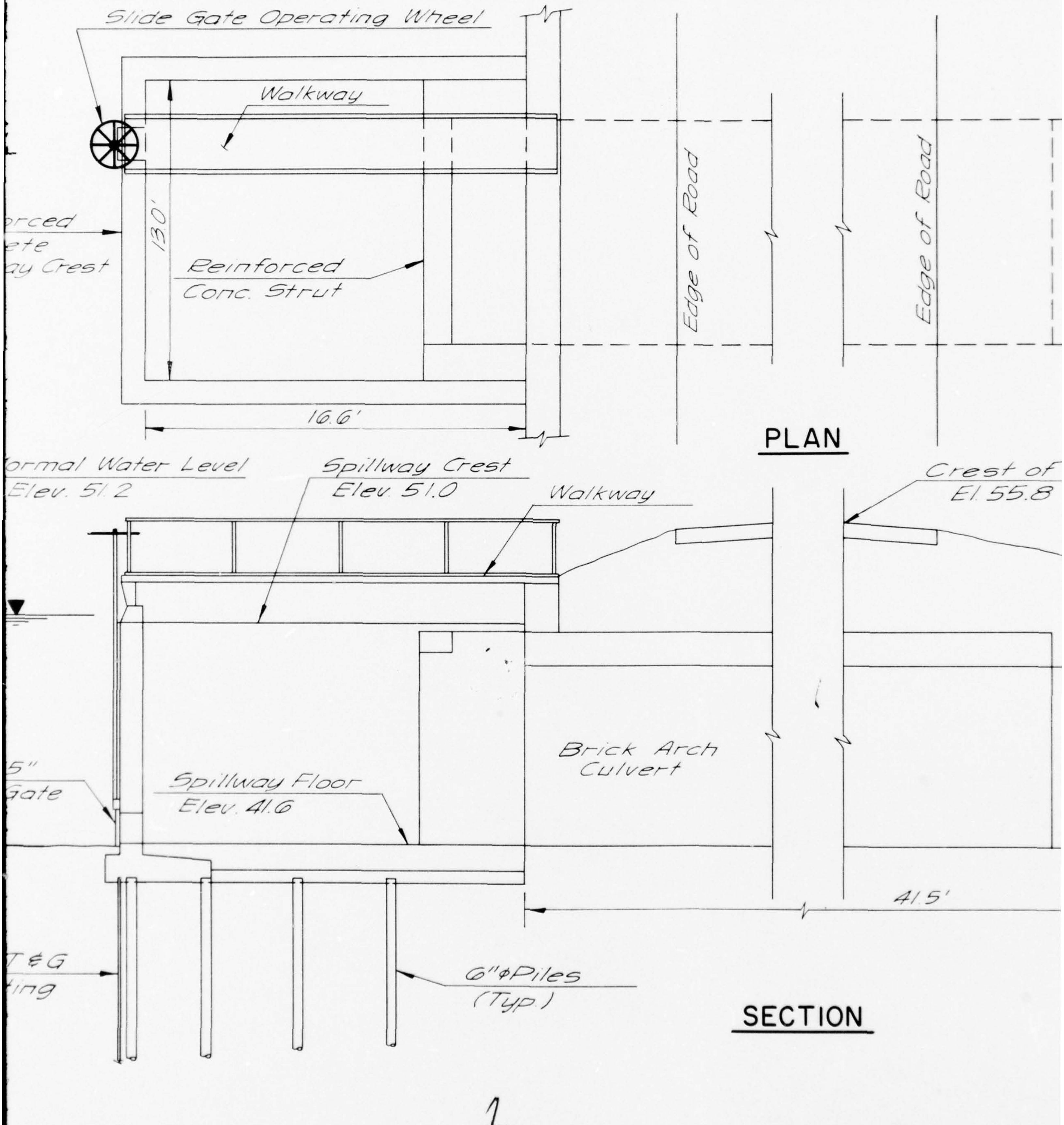
INSPECTION AND EVALUATION OF DAMS

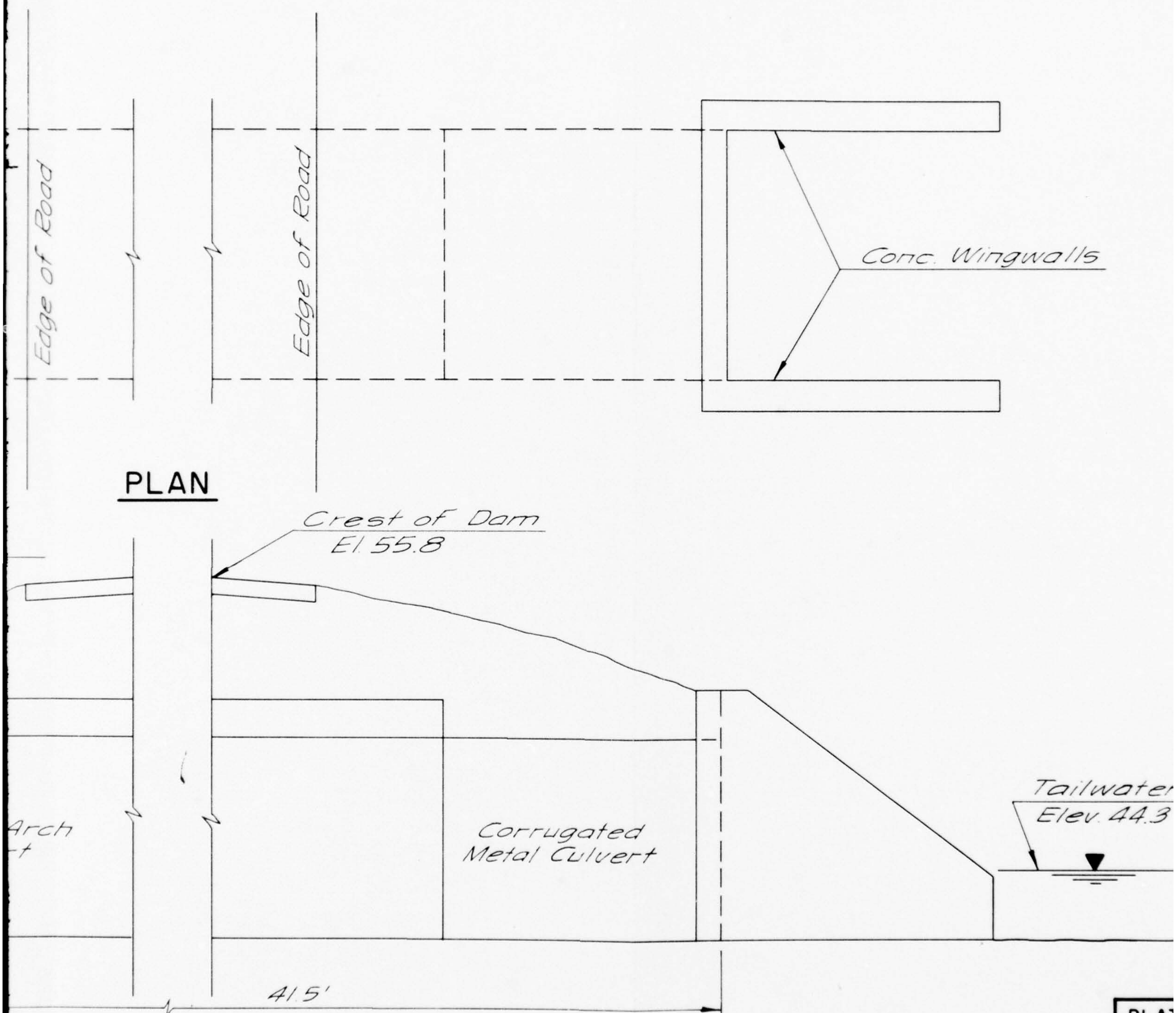
GENERAL PLAN

BREAKNECK DAM

I.D. N.J. 00425	SCALE: NOT TO SCALE
	DATE: FEBRUARY, 1979

2


Slide Gate Operating Wheel
Walkway
13.0'
orced
ete
ay Crest
Reinforced
Conc. Strut
16.6'
Edge of Road
Edge of Road
PLAN
ormal Water Level
Elev. 51.2
Spillway Crest
Elev. 51.0
Walkway
Crest of
El. 55.8
Brick Arch
Culvert
5"
Gate
Spillway Floor
Elev. 41.6
41.5'
T & G
ting
6"φ Piles
(Typ.)
SECTION
1



SECTION

PLAT

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESO
N.J. DEPT. OF ENVIR. PROT
TRENTON, NEW JERSE

INSPECTION AND EVALUATION OF DAMS

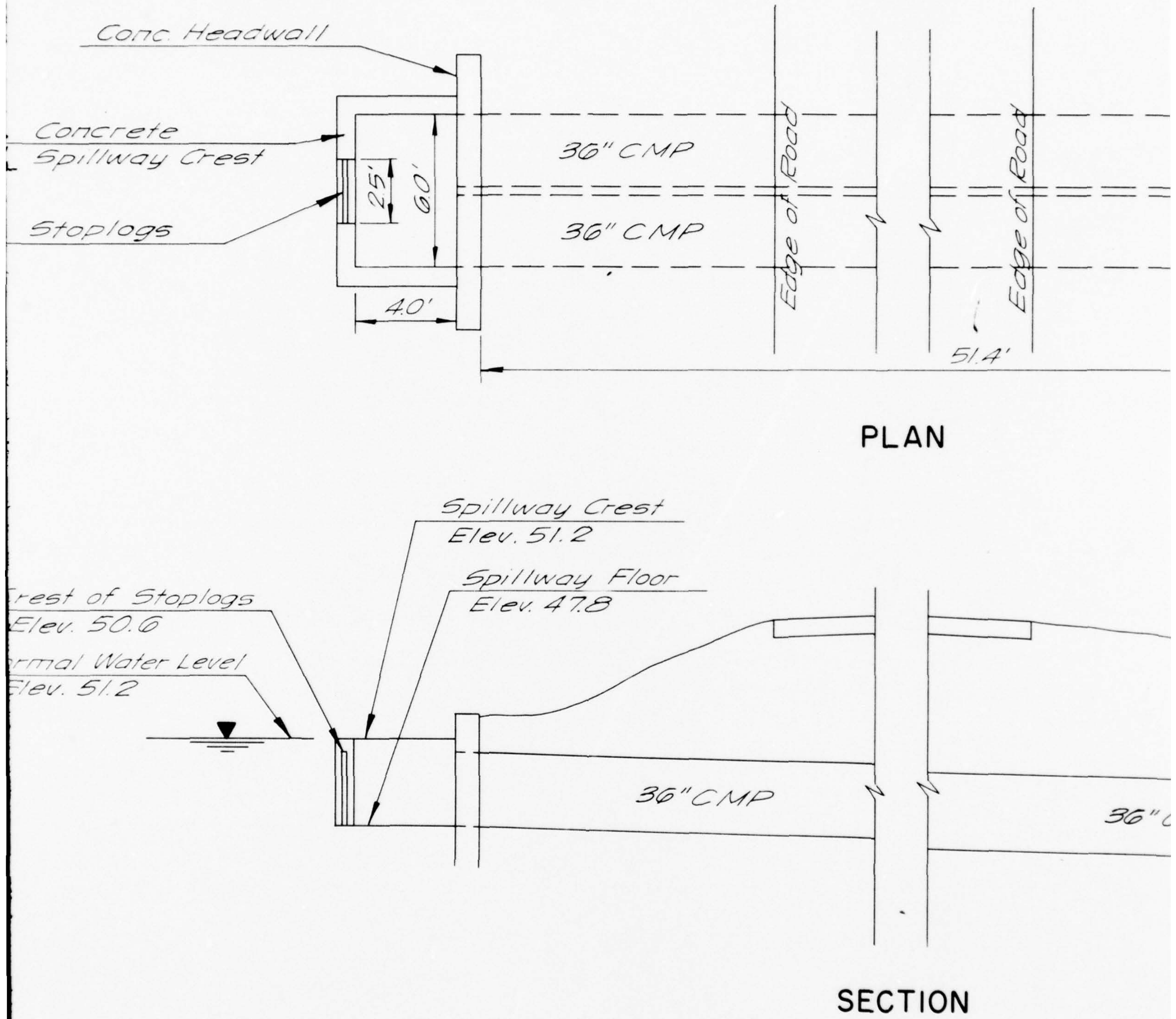
PRIMARY SPILLWAY

BREAKNECK DAM

I.D.N.J. 00425

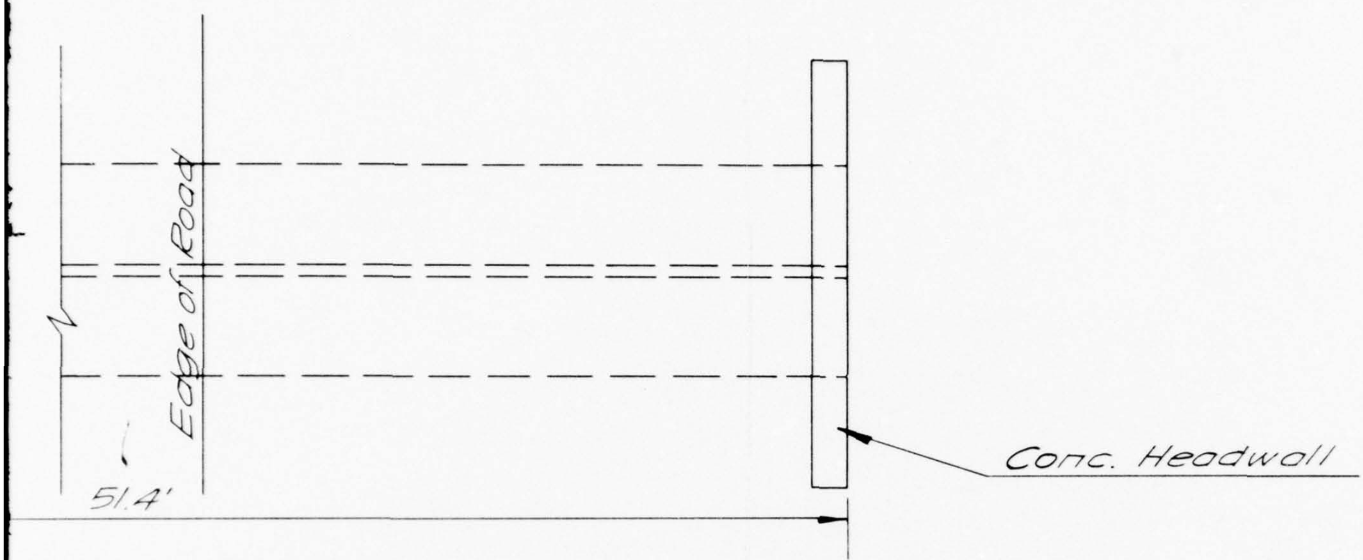
SCALE: NOT TO SCALE

DATE: FEBRUARY, 1979



Conc. Headwall
Concrete
Spillway Crest
Stoplogs
25'
6.0'
4.0'
36" CMP
36" CMP
Edge of Road
Edge of Road
51.4'
PLAN
Spillway Crest
Elev. 51.2
Spillway Floor
Elev. 47.8
Crest of Stoplogs
Elev. 50.6
Normal Water Level
Elev. 51.2
36" CMP
36" C
SECTION

1



LAN

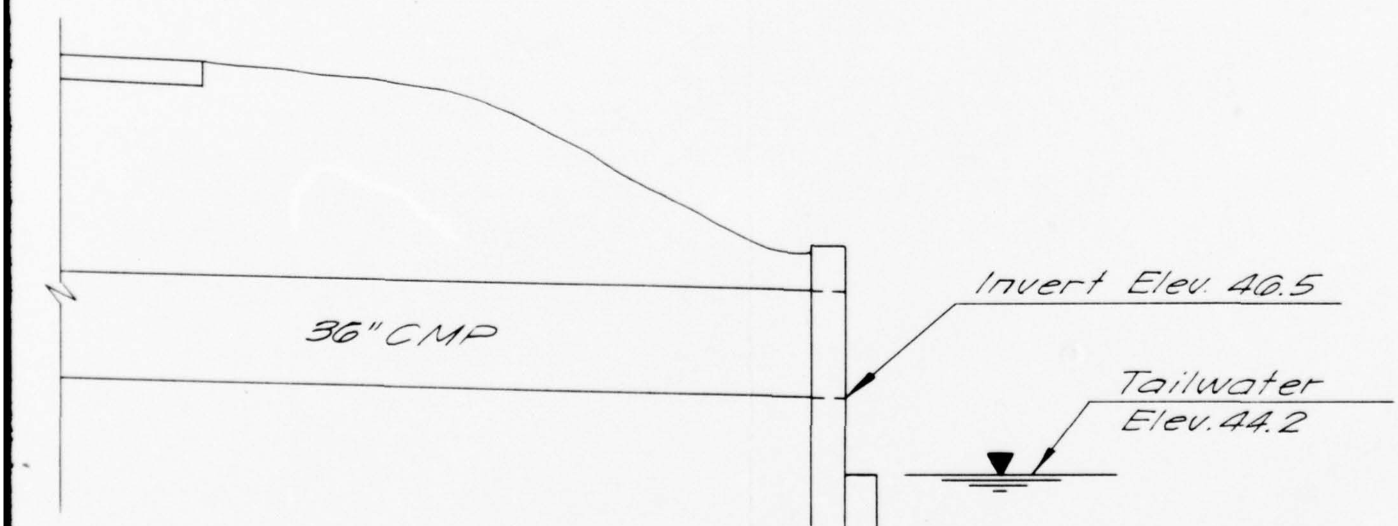


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PLATE 7

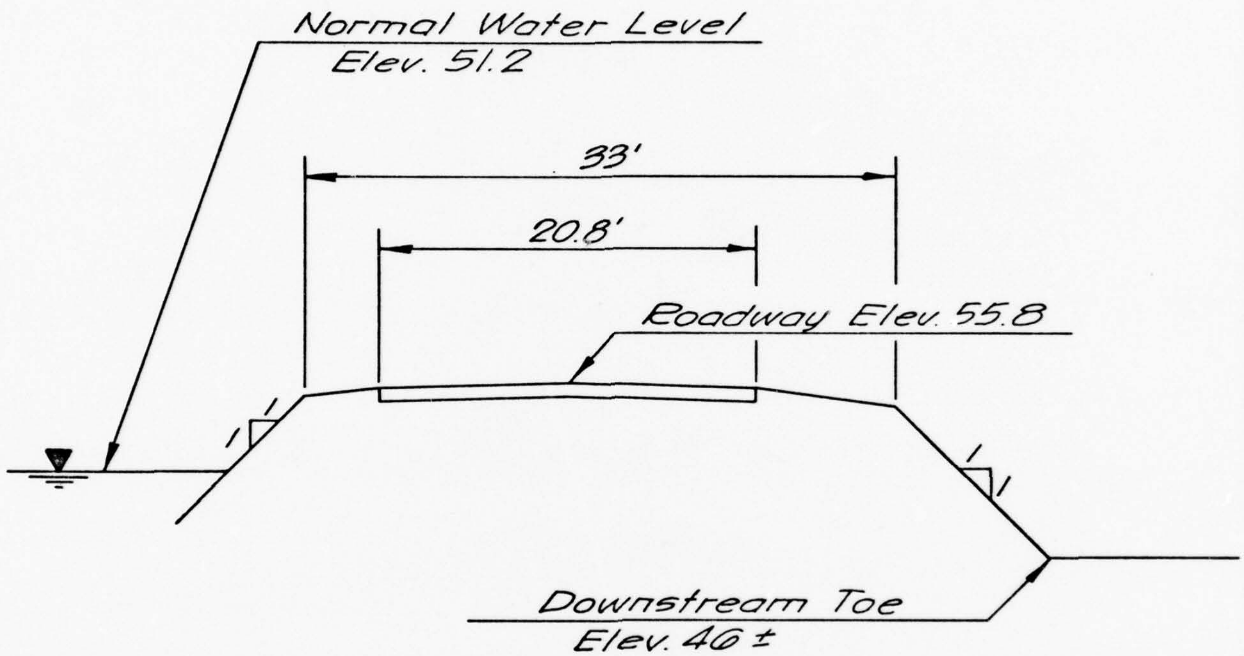
STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

SECONDARY SPILLWAY

BREAKNECK DAM

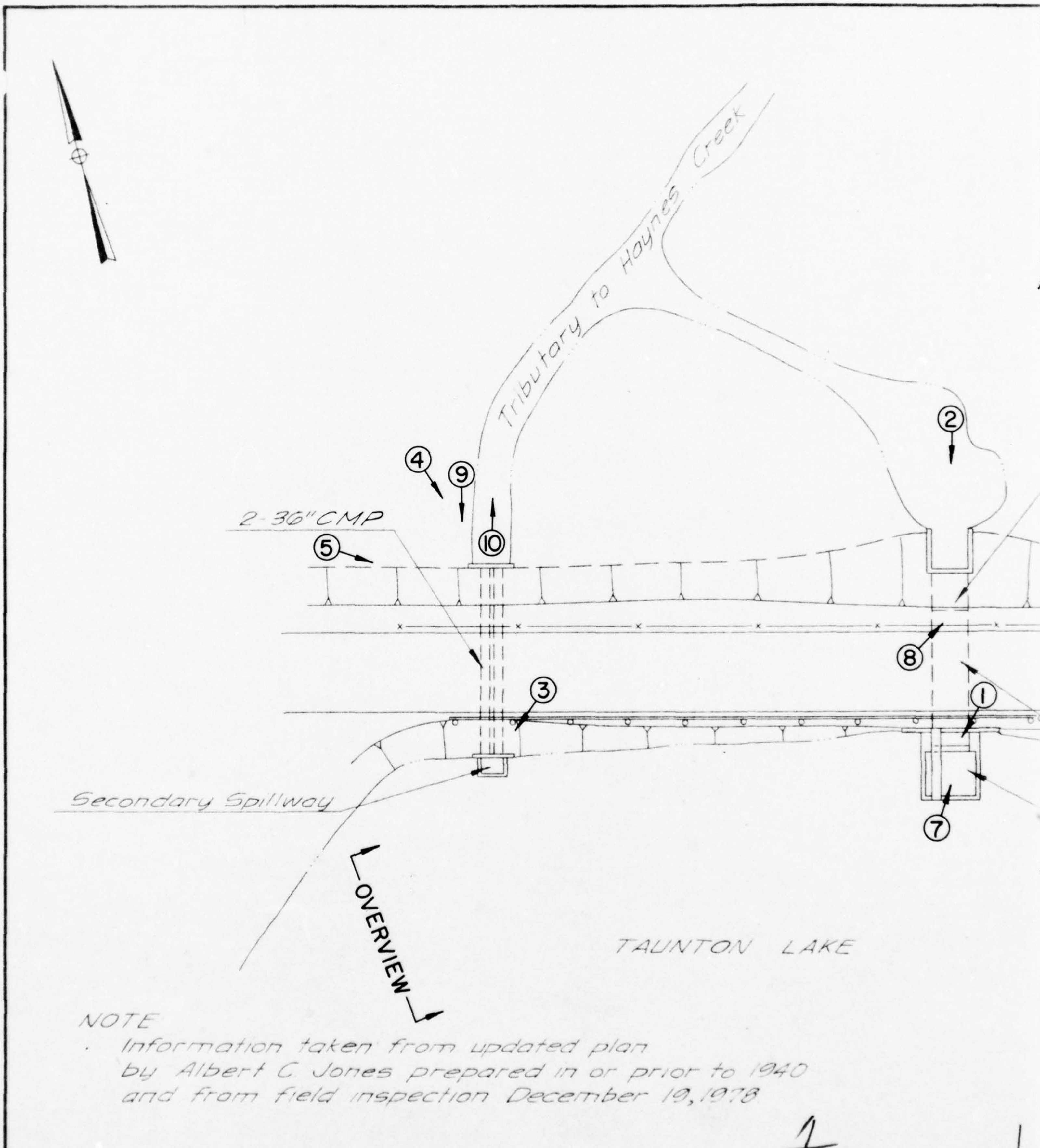
I.D. N.J. 00425	SCALE: NOT TO SCALE
	DATE: FEBRUARY, 1979



NOTE:
Information taken from field inspection December 19, 1978.

PLATE 8

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS **SECTION A-A** BREAKNECK DAM	
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D.N.J. 00425	SCALE: NOT TO SCALE DATE: FEBRUARY, 1979



Tributary to Haynes Creek
2-36"CMP
Secondary Spillway
OVERVIEW
TAUNTON LAKE
NOTE
Information taken from updated plan
by Albert C. Jones prepared in or prior to 1940
and from field inspection December 19, 1978
1

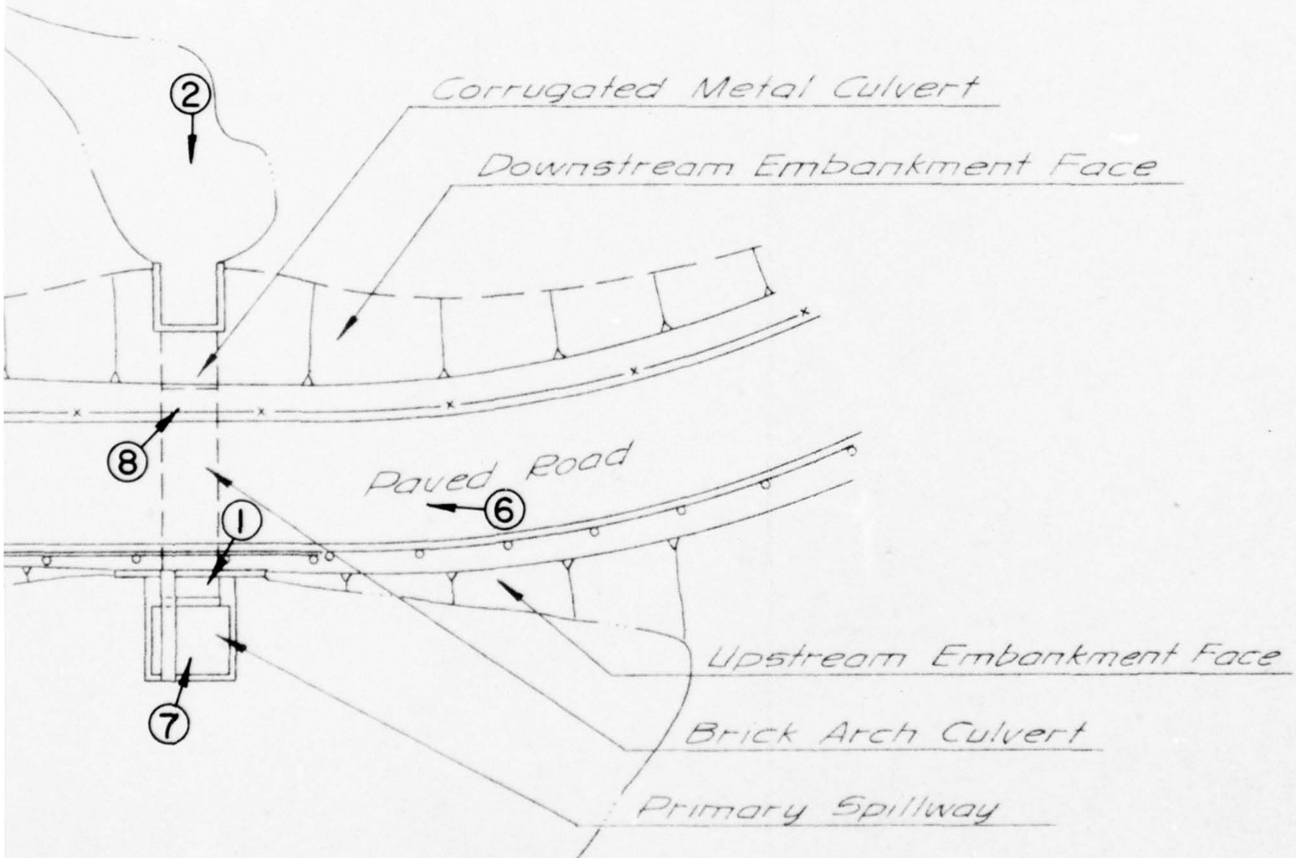


PLATE 9

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

PHOTO LOCATION PLAN

BREAKNECK DAM

I.D. N.J. 00425	SCALE: NOT TO SCALE
2	DATE: FEBRUARY, 1979

APPENDIX 1

Check List - Visual Inspection

Check List - Engineering Data

Check List
Visual Inspection
Phase 1

Name Dam Breakneck Dam County Burlington State N.J. Coordinators NJDEP

Date(s) Inspection 12/19/78 Weather Sunny Temperature $42^{o}F$

Pool Elevation at Time of Inspection 51.2 M.S.L. Tailwater at Time of Inspection 44.3 M.S.L.

Inspection Personnel:

J. Gribbin	R. McDermott	
D. Buckelew		
A. Miller		

J.G. Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEE PAGE ON LEAKAGE	N.A.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N.A.	
DRAINS	N.A.	
WATER PASSAGES	N.A.	
FOUNDATION	N.A.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBERSVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N.A.	
STRUCTURAL CRACKING	N.A.	
VERTICAL AND HORIZONTAL ALIGNMENT	N.A.	
MONOLITH JOINTS	N.A.	
CONSTRUCTION JOINTS	N.A.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Significant erosion on downstream face of embankment adjacent to primary spillway discharge culvert. Minor erosion along upstream and downstream faces of embankment.	
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	Horizontal: straight with slight curve at east end. Vertical: level	
RIPRAP FAILURES	Rip Rap placed at outlet of secondary spillway discharge culvert is scoured away.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	Embankment sandy with sparse grass and extensive brush and tree growth.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Satisfactory except on west side of discharge culvert for primary spillway where serious erosion from poor road drainage has occurred. Joint between brick arch and corrugated metal pipe arch downstream of primary spillway not accessible.	
ANY NOTICEABLE SEEPAGE	One seepage zone at edge of downstream channel 12' from secondary spillway discharge outlet. Seepage discharge contains orange silt.	
STAFF GAGE AND RECORDER	None	
DRAINS	None observed	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	See Discharge Channel for Primary Spillway..	
INTAKE STRUCTURE	Slide gate at upstream end of primary spillway-could not be clearly observed. Walkway spanning drop inlet satisfactory condition.	Operating mechanism not operated at time of inspection.
OUTLET STRUCTURE	N.A.	
OUTLET CHANNEL	See Discharge Channel for Primary Spillway.	
EMERGENCY GATE	Same as Intake Structure.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Appears to be in satisfactory condition. Debris accumulated along weir and in drop inlet. Open top on drop inlet is a physical safety hazard.	Submerged by overflow. Surface of conc. has exposed aggregate. Conc. weir consists of walls of drop inlet.
APPROACH CHANNEL	N.A.	
DISCHARGE CHANNEL	Appears to be in satisfactory condition. Concrete of outlet headwall in good condition.	Arch culvert through dam. Upstream end - brick arch. Downstream end - CMP arch. The two arch components have different cross-section dimensions.
BRIDGE AND PIERS	N.A.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Generally in good condition. Surface of concrete has exposed aggregate. Concrete headwall in satisfactory condition. Debris accumulated along weir and in drop inlet. Open top on drop inlet is a physical safety hazard.	Spillway consists of uncontrolled weir combined with timber stoplog gate. Conc. weir consists of walls of drop inlet.
APPROACH CHANNEL	N.A.	
DISCHARGE CHANNEL	Appears to be in satisfactory condition. Pipes not completely observed. Debris accumulated in pipes and in outlet.	2 - 36" diam. CMP
BRIDGE AND PIERS	N.A.	
GATES AND OPERATION EQUIPMENT	Timber stoplogs appear to be in satisfactory condition.	Submerged by overflow at time of inspection.

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	N.A.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Slope of lake shore are moderate to steep (3% to greater than 10%)	
SEDIMENTATION	Unknown	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Primary spillway discharges into stilling basin which flows by natural channel into natural channel flowing from secondary spillway. Streams generally free of significant obstructions. Some debris observed.	
SLOPES	Slopes of stream banks moderate.	
APPROXIMATE NO. OF HOMES AND POPULATION	Lake Pine is located approx. 1000 feet downstream from the dam. Approx. 70 homes along shores of Lake Pine.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	Not Available
REGIONAL VICINITY MAP	Available
CONSTRUCTION HISTORY	Available for 1940 repair work.
TYPICAL SECTIONS OF DAM	Not Available
HYDROLOGIC/HYDRAULIC DATA	Available
OUTLETS - PLAN	
- DETAILS -CONSTRAINTS -DISCHARGE RATINGS	Available for Primary Outlet Not Available for Secondary Outlet
RAINFALL/RESERVOIR RECORDS	Not Available

ITEM	REMARKS
DESIGN REPORTS	Not Available
GEOLOGY REPORTS	Not Available
DESIGN COMPUTATIONS	
HYDROLOGY & HYDRAULICS	Available for 1940 repair of Primary Spillway
DAM STABILITY	
SEEPAGE STUDIES	Not Available
MATERIALS INVESTIGATIONS	Not Available
BORING RECORDS	
LABORATORY	
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	Annual Report by T.A. Shaw, P.E. Jan. 20, 1971
BORROW SOURCES.	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Not Available
HIGH POOL RECORDS	Not Available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Annual Report By T.A. Shaw, P.E., Jan. 20, 1971
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Dam breached in early Sept. 1940. Inspection Report by John C. King on Sept. 4, 1940
MAINTENANCE OPERATION RECORDS	No formal records.

ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	Available for Pimary Spillway
DETAILS	Not available for Secondary Spillway
OPERATING EQUIPMENT PLANS & DETAILS	Available for slide gate on Primary Spillway

APPENDIX 2

Photographs

PHOTO 1

PRIMARY SPILLWAY

PHOTO 2

PRIMARY SPILLWAY DISCHARGE CULVERT

19 DEC. 1978

PHOTO 3

SECONDARY SPILLWAY

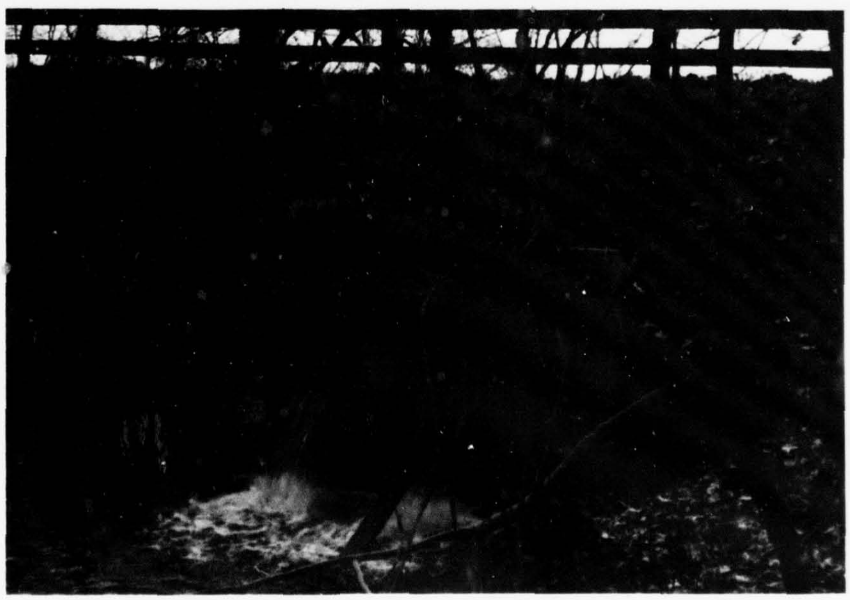


PHOTO 4

SECONDARY SPILLWAY DISCHARGE PIPES

19 DEC. 1978

PHOTO 5

DOWNSTREAM FACE OF DAM

PHOTO 6

PAVED ROAD ON CREST OF DAM

19 DEC. 1978

PHOTO 7

CONCRETE STRUT ACROSS PRIMARY SPILLWAY.
BRICK ARCH CULVERT.

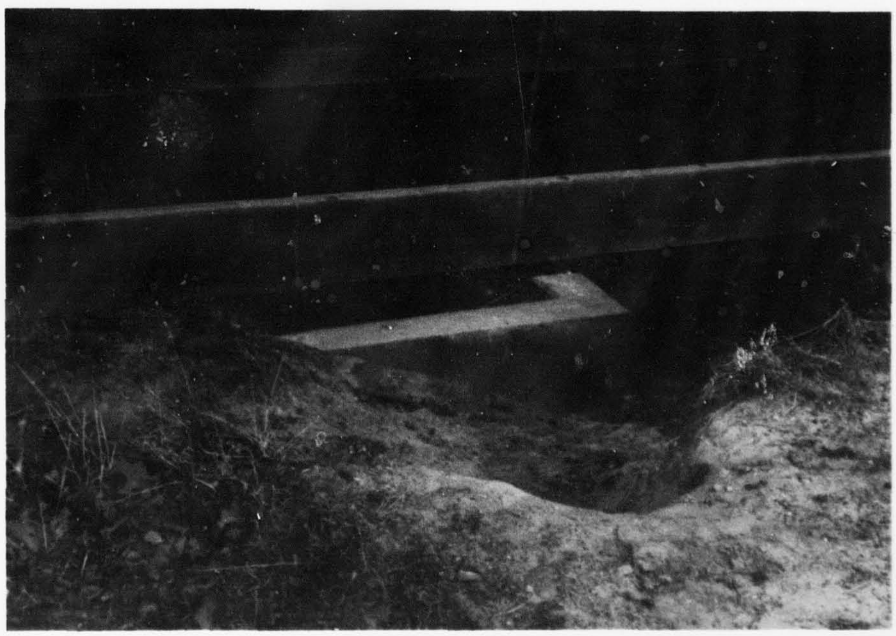


PHOTO 8

EROSION AT DOWNSTREAM HEADWALL FOR PRIMARY
SPILLWAY DISCHARGE CULVERT.

19 DEC. 197

PHOTO 9

SEEPAGE AT DOWNSTREAM CHANNEL

PHOTO 10

DOWNSTREAM CHANNEL

19 DEC. 1978

APPENDIX 3

Engineering Data

CHECK LIST

HYDROLOGIC AND HYDRAULIC DATA

ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Mostly undeveloped wooded and swampy areas with substantial residential development along lake shores.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 51 (125 acre-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N.A.

ELEVATION MAXIMUM DESIGN POOL: 57.4

ELEVATION TOP DAM: 55.8

PRINCIPAL SPILLWAY CREST: Concrete Box Drop Inlet

a. Elevation 51.0

b. Type Concrete Box Drop Inlet

c. Width 11 inches

d. Length 43 feet

e. Location Spillover Inside Drop Inlet

f. Number and Type of Gates (1) 15"x15" manual slide gate

AUXILIARY SPILLWAY CREST: Concrete Box Drop Inlet w/stoplogs

a. Elevation 50.6 (Stoplogs), 51.2 (Sidewalls)

b. Type Concrete Box Drop Inlet

c. Width 3 inches (Stoplogs), 8 inches (Sidewalls)

d. Length 2.5' (Stoplogs), 11.5' (Sidewalls)

e. Location Spillover Inside Drop Inlet

f. Number and Type of Gates 2.5' Stoplogs

OUTLET WORKS: Slide Gate on Primary Spillway

a. Type Manual Gate, 15" x 15"

b. Location South face in SW corner of Primary Spillway

c. Entrance invert 41.6

d. Exit invert 41.6

e. Emergency draindown facilities: Slide Gate

HYDROMETEOROLOGICAL GAGES: None

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake stage equal to top of dam) 1298 c.f.s.

APPENDIX 4

Hydrologic Computations

Size classification

Storage volume of top of dam. 354 AC-ft

Average depth of lake 6 ft.

Hydraulic height of dam 14.2 ft

Size classification Small

Hazard Potential Classification

Number of inhabitable structures 15 (estimated)

Hazard potential classification high

Recommended SDF (½ PMF to PMF) use ½ PMF

Hydrologic Analysis

The HEC-1-DB will be used to route the flood in the subarea by Clark's method and then combined with the outflow hydrograph from Centennial Lake Dam to form the total hydrograph to Breakneck Dam.

Total drainage area = 13.0 sq. mi.
Centennial drainage area = 7.3 sq. mi.
Incremental Drainage Area = 5.7 sq. mi.

STORCH ENGINEERS

Sheet 2 of 13

Project 1132 Made By PL Date 3-7-79

Breakneck Dam Chkd By DMP Date 3-14-79

Precipitation

Re. "Design of Small Dams" USDI 1973

From fig 15, Zone 6

Probable Maximum Precipitation = 27 inches for 6 hr. duration and 10 sq. mi area

Duration (hrs)	% PMP
6	100
12	109
24	117

Infiltration Data

Since watershed area consists of high infiltration type soil and covered with woodlots, max. infiltration will be used.

Use initial infiltration 1.5 inches
constant infiltration 0.15 inches

Time of concentration & Clark's parameter

By the use of

$$T_C + R = 21\,(DA/S)^{0.22}\,(S_t)^{0.33}\,(1.0 + 0.3\,I)^{-0.28}$$

$$\frac{R}{T_C + R} = 0.76$$

STORCH ENGINEERS

Sheet 3 of 13

Project 1132 Made By RL Date 3-7-79

Breakneck Dam Chkd By DMP Date 3-14-79

Cont. Tc & R

D_A = 5.7 sq mi

S = 26.3 ft/mi

S_t = 3%

I = 3%

Tc = 4.36 hr. R = 13.64

Lake Storage Volume

Information from USGS & Aerial Photos

Stage EL USGS	Surface Area	
41.6	0	Ac
51	39	Ac
60	78	Ac

(Note EL 51 USGS = EL 93.0 shown on plan)

HEC-1-DB program will develope storage capacity from surface area and el.

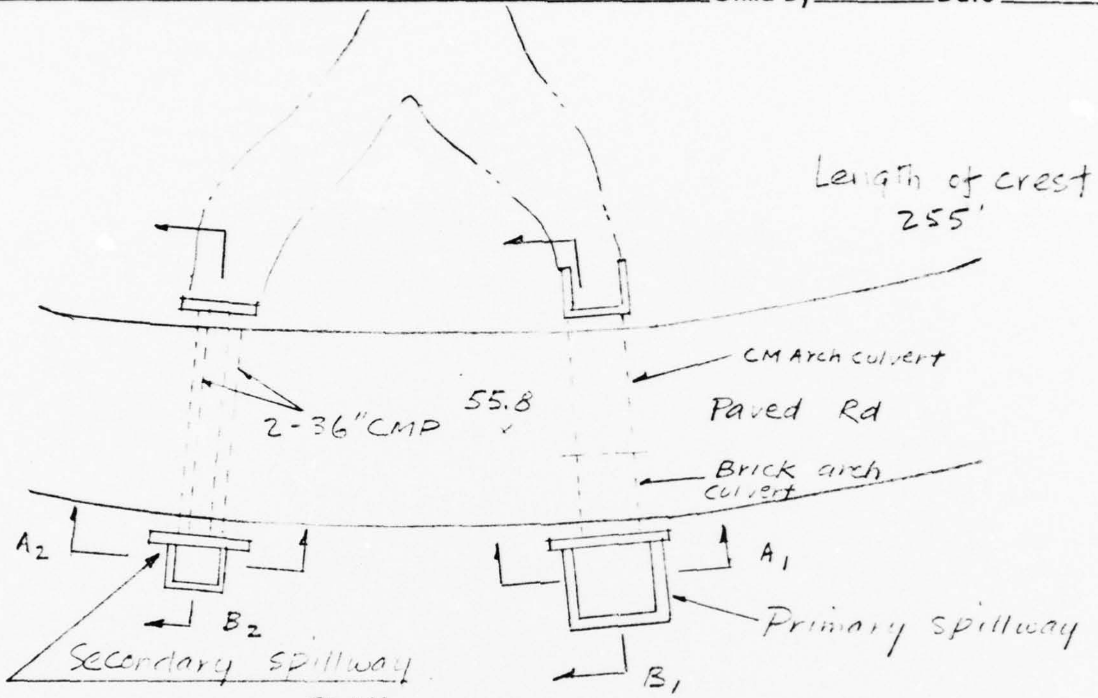
STORCH ENGINEERS

Project 1132 Breakneck Dam

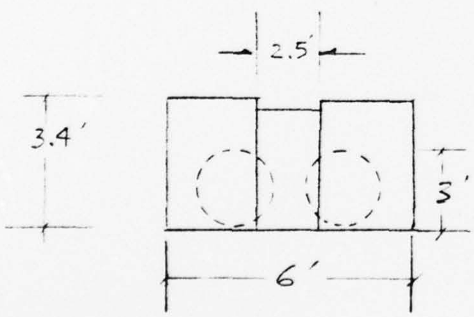
Sheet 4 of 13

Made By RL Date 3-7-79

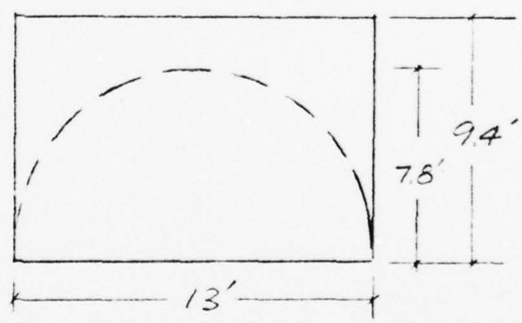
Chkd By EAW Date 3-13-79



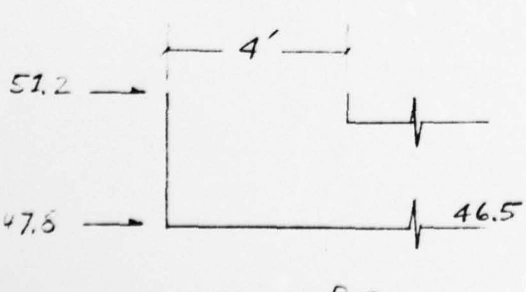
-PLAN-



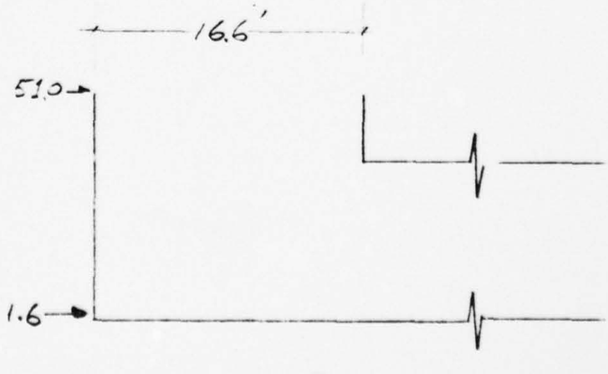
A 2



A 1



B 2



B 1

-SECONDARY SPILLWAY- -PRIMARY SPILLWAY-

All dimensions shown are inside measurements

STORCH ENGINEERS

Sheet 5 of 13

Project 1132 Made By RL Date 4-4-79

Breakneck Dam Chkd By EAW Date 4-4-79

Stage Discharge Calculation

Primary Spillway (Weir flow)

Effective length 46.2 - 1.2 = 45 ft.
(1.2 ft is the correction ≈ 0.2H at the ends of spillway and H average ≈ 3' is used.)

(ft) W.L.	(ft) h	C	(cfs) $Q = CLh^{3/2}$
51	0	-	0
52	1	3.0	135
53	2	3.3	420
54	3	3.3	772
55	4	3.3	1188
56	5	3.3	1660
57	6	3.3	2182
58	7	3.3	2750
59	8	3.3	3360
60	9	3.3	4010
62	11	3.3	5418
64	13	3.3	6961

PHOTO 2

PRIMARY SPILLWAY DISCHARGE CULVERT

19 DEC. 1978

Sheet 6 of 13

PROJECT: Breakneck Dam 1132
Primary Spillway Culvert

DESIGNER: RL
CHECKED: EAW
DATE: 4-4-79

HYDROLOGIC AND CHANNEL INFORMATION

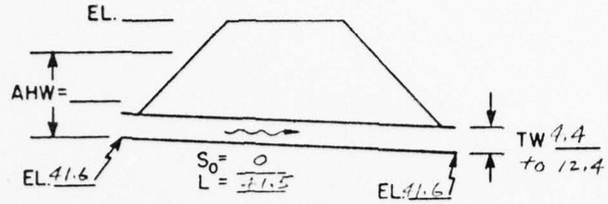
Culvert Size (estimated)
12'10" x 8'4"
CMP Arch

Q_1 = Max with no overtop; TW_1 = 4.4'
Q_2 = Max with overtopping; TW_2 = 12.4'

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: Primary Spillway



MEAN STREAM VELOCITY = ______
MAX. STREAM VELOCITY = ______

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q (cfs)	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	INLET CONT. HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	~~COST~~ W.L.	COMMENTS
Headwall	420	12'10" x 8'4"	0.67	5.6	0.5	0.5	3.6	6	4.4	6	-	6.5	6.5		48.1	Outlet Control
"	772	"	1.0	8.3	0.5	2.4	5.2	6.8	6.7	6.8	-	9.2	9.2		50.8	" "
"	1188	"	1.5	12.5	0.5	5.7	6.5	7.9	10.0	10.0	-	15.7	15.7		57.3	" "
"	1660	"	2.5	20.8	0.5	11.2	7.6	8.0	12.4	12.4	-	23.6	23.6		65.2	" "

SUMMARY & RECOMMENDATIONS:

Figure 7

PHOTO 4

SECONDARY SPILLWAY DISCHARGE PIPES

19 DEC. 1978

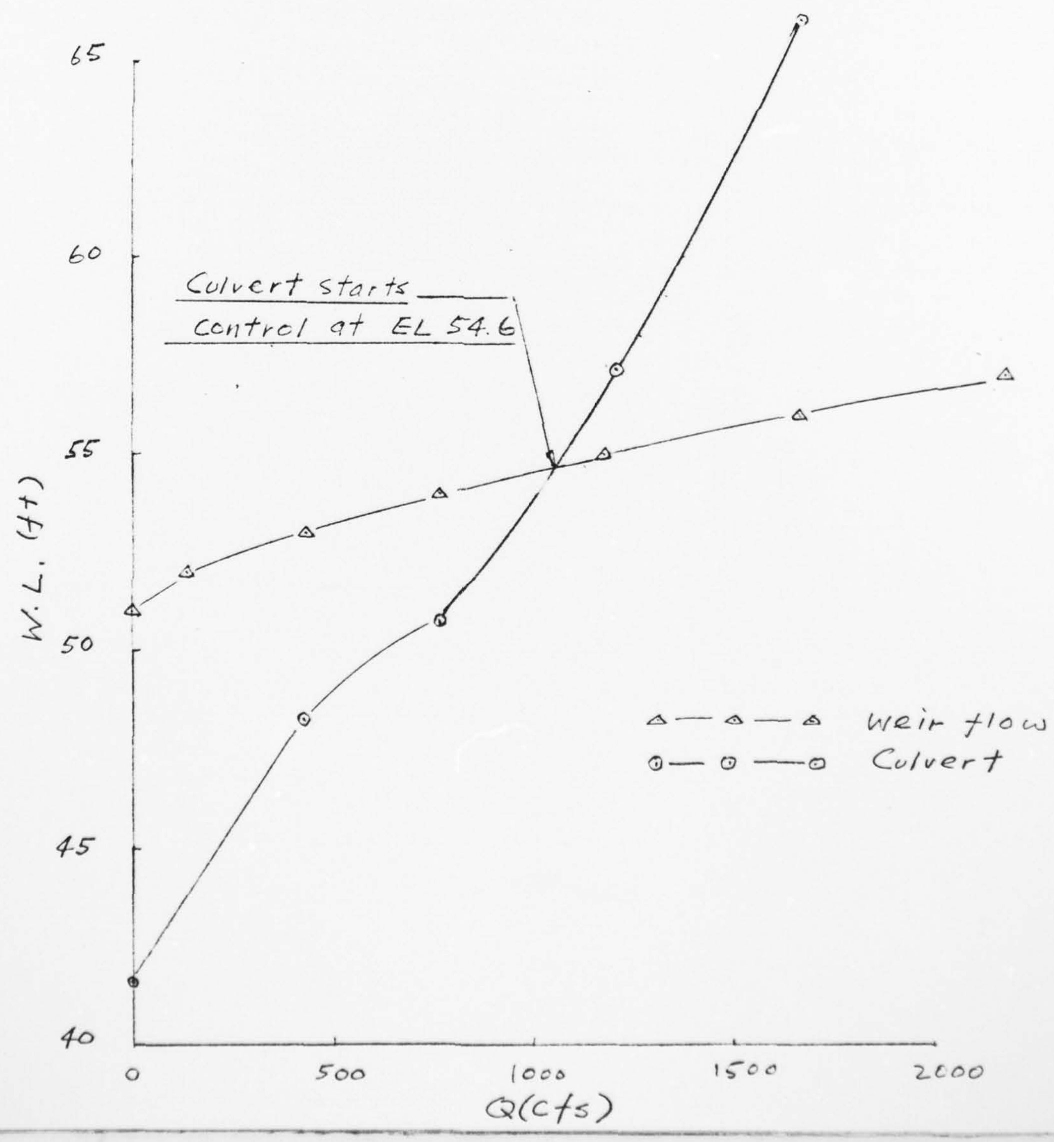
STORCH ENGINEERS

Sheet 7 of 13

Project 1132 — Made By RL Date 4-4-79

Breakneck Dam — Chkd By EAW Date 4-5-79

Stage Discharge Curves for Primary Spillway weir and Primary Spillway culvert



STORCH ENGINEERS

Project 1132 Made By RL Date 4-4-79

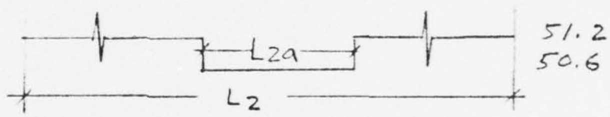
Breakneck Dam Chkd By EAW Date 4-5-79

Stage Discharge Calculation

Secondary Spillway (weir flow)

Effective length $L_2 = 11.5' - 1.2' = 10.3'$

" " $L_{2a} = 2.5' - 0.2' = 2.3'$



W.L (ft)	h_2	h_{2a}	C_2	C_{2a}	Q_2	Q_{2a}	ΣQ (cfs)
51	0	0.4	2.8	3.3	0	2	2
52	0.8	1.4	3.0	3.3	22	13	35
53	1.8	2.4	3.3	3.3	82	28	110
54	2.8	3.4	3.3	3.3	159	48	207
55	3.8	4.4	3.3	3.3	252	70	322
56	4.8	5.4	3.3	3.3	357	95	452
57	5.8	6.4	3.3	3.3	475	123	598
58	6.8	7.4	3.3	3.3	603	153	756
59	7.8	8.4	3.3	3.3	740	185	[illegible]
60	8.8	9.4	3.3	3.3	887	219	[illegible]
62	10.8	11.4	3.3	3.3	1206	[illegible]	[illegible]
64	12.8	13.4	3.3	3.3	1557	[illegible]	[illegible]

AD-A069 907 NEW JERSEY STATE DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/2
NATIONAL DAM SAFETY PROGRAM. BREAKNECK DAM (NJ-00425), DELAWARE--ETC(U)
MAY 79 R J MCDERMOTT DACW61-78-C-0124

UNCLASSIFIED NL

2 OF 2
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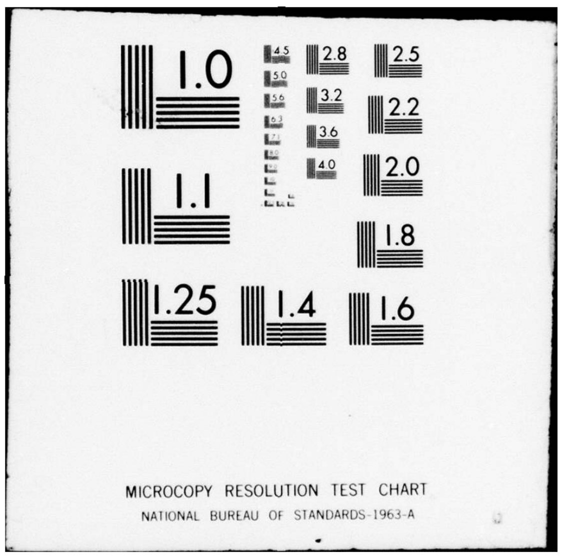

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

RL 4-5-79
EAW 4-5-79
Sheet 9 of 13

PROJECT: Breakneck Dam
Secondary Spillway Culvert

DESIGNER: RL
DATE: 4-4-79

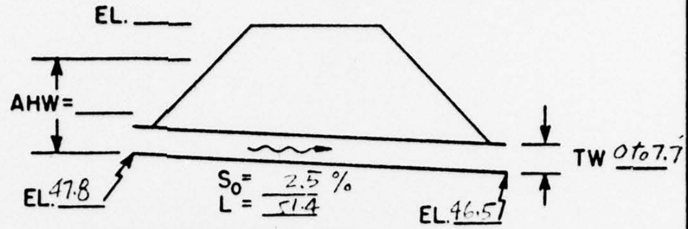
HYDROLOGIC AND CHANNEL INFORMATION

Q_1 = ______ TW_1 = ______
Q_2 = ______ TW_2 = ______

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: ______



MEAN STREAM VELOCITY = ______
MAX. STREAM VELOCITY = ______

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	INLET CONT. HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	~~COST~~ W.L.	COMMENTS
Headwall	110	2 36"RCP	1.5	4.5'	0.5	1.6	2.9	2.7	0	2.7	1.3	3	4.5		52.3	Inlet control
"	207	"			0.5	5.8	3	3	5.0	5.0	1.3	9.5	9.5		57.3	Outlet control
"	322	"			0.5	14.0	3	3	7.7	7.7	1.3	20.4	20.4		68.2	Outlet control

SUMMARY & RECOMMENDATIONS:

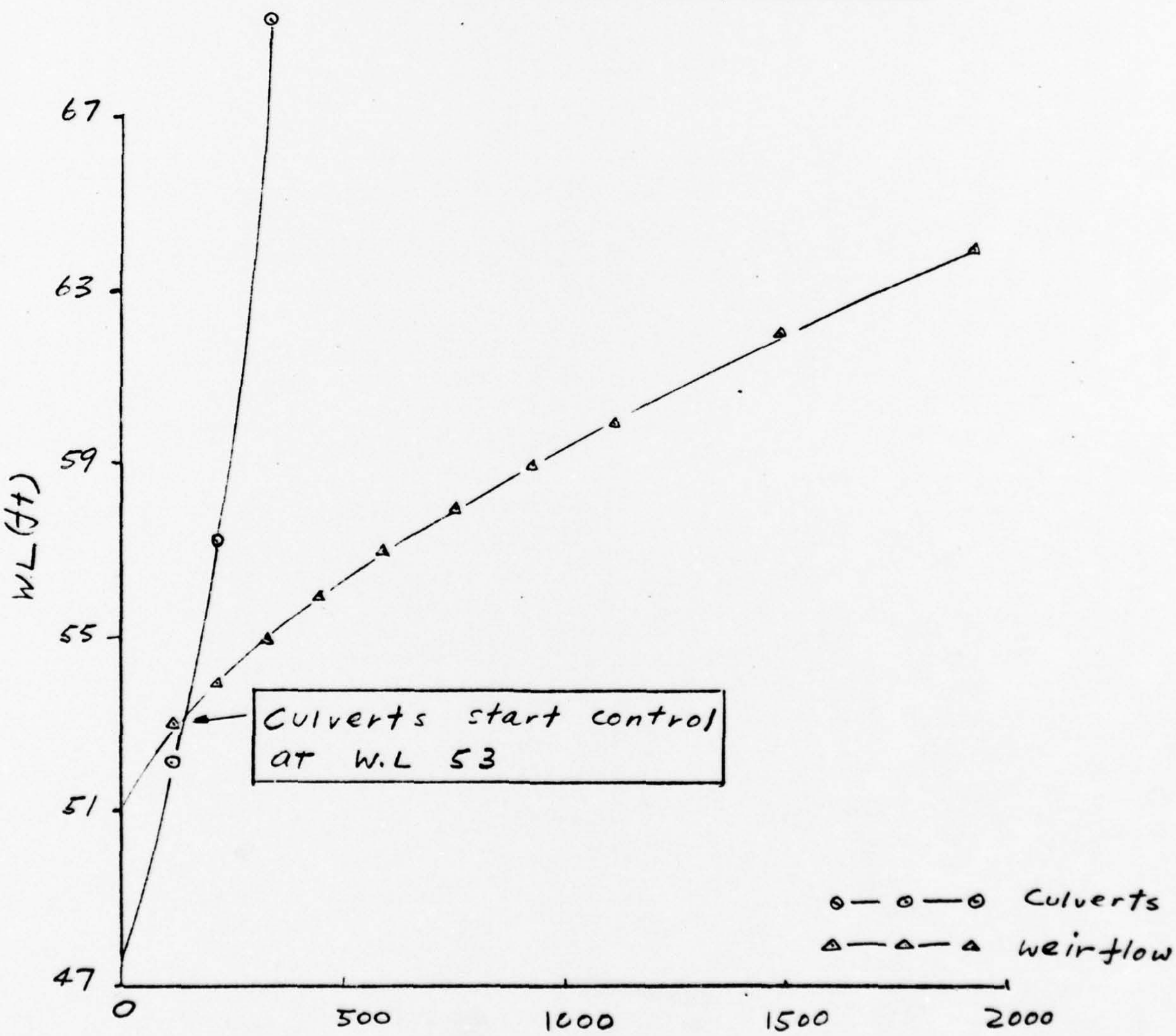
Figure 7

STORCH ENGINEERS Sheet 10 of 13

Project 1132 Made By RL Date 4-4-79

Breakneck Dam Chkd By EAW Date 4-5-79

Stage Discharge Curve for Secondary Spillway weir and Secondary Spillway culverts



STORCH ENGINEERS

Sheet 11 of 13

Project 1132 · Breakneck Dam

Made By RL Date 4-4-79

Chkd By EAW Date 4-5-79

Stage Discharge Table

Primary Spillway

W.L.(ft)	Q(cfs)
51	0
52	135
53	420
54	772
55	1070
Top of dam	55.8
56	1110
57	1190
58	1280
59	1340
60	1380
62	1490
64	1580

Secondary Spillway

W.L.(ft)	Q(cfs)
51	2
52	35
53	110
54	155
55	180
Top of dam	55.8
56	200
57	208
58	220
59	240
60	255
62	285
64	300

STORCH ENGINEERS

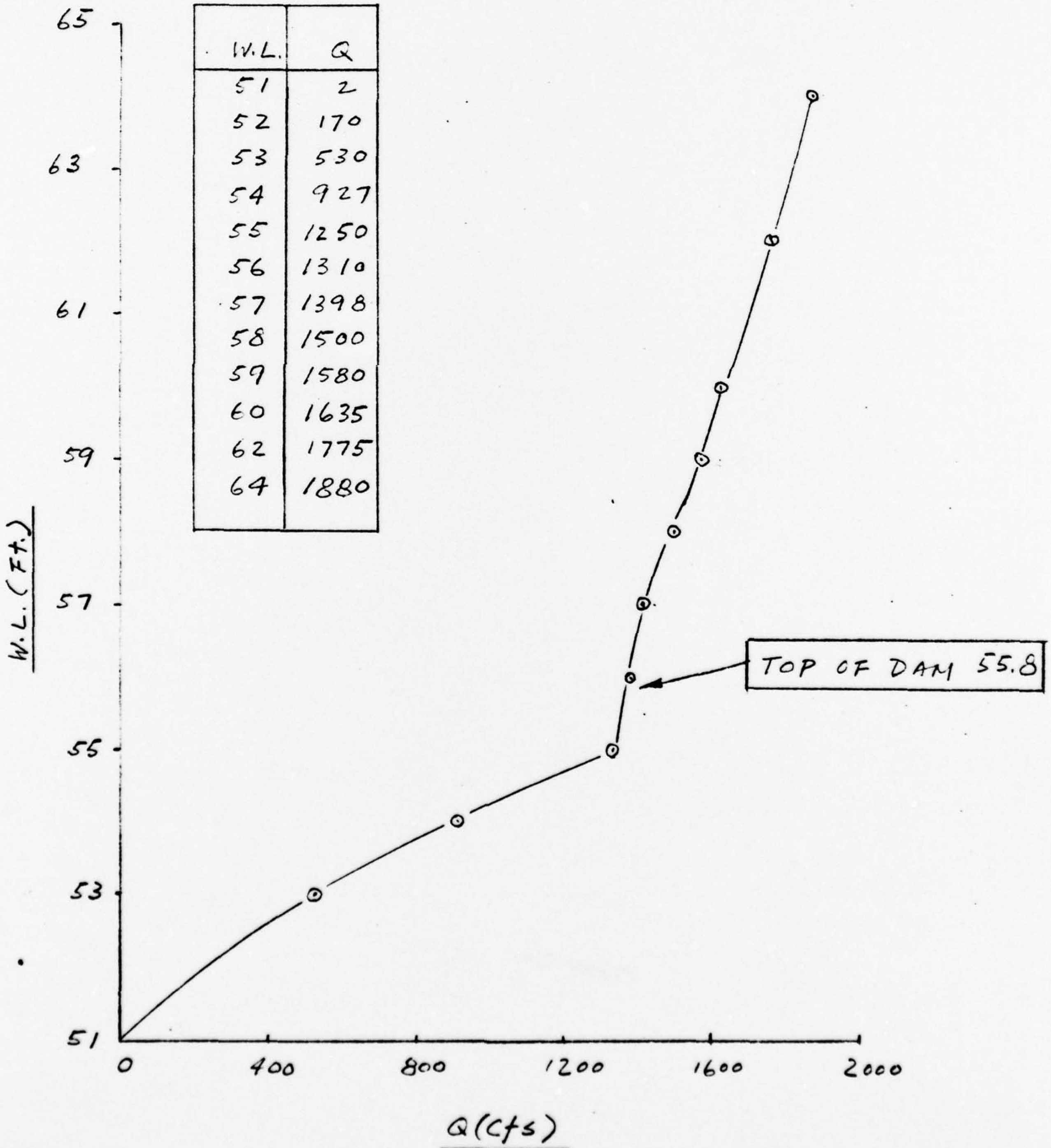
Sheet 12 of 13

Project 1132 — Made By RL Date 4-5-79

Breakneck Dam — Chkd By EAW Date 4-5-79

Elevation - Discharge Curve
Breakneck Dam Spillways

W.L.	Q
51	2
52	170
53	530
54	927
55	1250
56	1310
57	1398
58	1500
59	1580
60	1635
62	1775
64	1880



STORCH ENGINEERS Sheet 13 of 13

Project 1132 Made By RL Date 3-13-79

Breakneck Dam (Taunton Lake) Chkd By EAW Date 3-13-79

Outlet Works Capacity

Normal pool elevation 51.0 ft.

Normal depth at outlet works 9.4 ft

Discharge occurs thru 15" x 15" slide gate

$$Q = CA\sqrt{2gh}$$

$C = 0.6$

$A = 1.56$ sq ft

$h = 9.4 - 0.6 = 8.8$ (To center of gate)

$$Q_{max} = 0.6(1.56)\sqrt{2g(8.8)}$$

$$= \underline{\underline{22.3 \text{ cfs}}}$$

HEC-1-DB COMPUTATIONS

```
A1                       DAM SAFETY ANALYSIS NEW JERSEY
A2                    CENTENNIAL LAKE DAM/BREAKNECK DAM
A3                               PMF ROUTING
B      300       1       0                               0       0       3
B1       5
J        1       1       1
J1    0.50
K        0    TAUN                       0       0       1
K1                SUBAREA INFLOW HYDROGRAPH FOR TAUNTON LAKE
M        1       0     5.7             5.7       0
P        0      27     100     109     117
T                                                      1.5    0.15
V     4.36   13.64       0
X     -1.0   -0.05     2.0
K        0    CENT                       0       0       1
K1               SUBAREA INFLOW HYDROGRAPH FOR CENTENNIAL LAKE
M        1       0     7.3             7.3       0                       1
P        0      27     100     109     117
T                                                      1.5    0.15
V      8.7    27.7       0
X     -1.0   -0.05     2.0
K        1    TAUN                       0       0       1
K1               ROUTED DISCHARGE THROUGH CENTENNIAL LAKE DAM
Y                                1       1
Y1       1                                           -59.6      -1
Y4    59.6    60.0    60.5    61.0    61.5    62.0    62.5    63.0    63.5    64.0
Y4    54.5    65.0    65.5    66.0    67.0    68.0    69.0    70.0
Y5       0       9      30      58      93     132     175     202     222     241
Y5     256     270     307     428     451     475     496     517
$A       0     334     358    1244
$E    47.9    59.6      60      70
$$    59.6
$D      66    2.63     1.5     300
K        2    TAUN                       0       0       1
K1                  COMBINE HYDROGRAPHS IN TAUNTON LAKE
K        1    BRNK                       0       0       1
K1                ROUTE HYDROGRAPH THROUGH BREAKNECK DAM
Y                                1       1
Y1       1                                           -51.0      -1
Y4      51      52      53      54      55      56      57      58      59      60
Y4      62      64
Y5       2     170     530     927    1250    1310    1398    1500    1580    1635
Y5    1775    1980
$A       0      39      78
$E    41.6      51      60
$$    51.0
$D    55.8    2.63     1.5     255
K        1    LKPN                       0       0       1
K1                ROUTE HYDROGRAPH THROUGH LAKE PINE DAM
Y                                1       1
Y1       1                                           -41.0      -1
Y4    41.0    42.0    43.0    44.0    45.0    46.0    46.9    48.0    54.0
Y5       0      93     305     644    1022    1448    1544    1697    2094
$A       0      17      46
$E    33.1      41      50
$$    41.0
$D    46.9    2.63     1.5     140
K       99
A
A
A
A
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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION       JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************

RUN  DATE# 79/04/17.
     TIME# 09.19.39.

                         DAM SAFETY ANALYSIS NEW JERSEY
                      CENTENNIAL LAKE DAM/BREAKNECK DAM
                                  PMF ROUTING

                               JOB SPECIFICATION
     NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
    300       1       0       0       0       0       0       0       3       0
                          JOPER     NWT   LROPT   TRACE
                              5       0       0       0

                       MULTI-PLAN ANALYSES TO BE PERFORMED
                             NPLAN= 1 NRTIO= 1 LRTIO= 1
     RTIOS=     .50

  **********     **********     **********     **********     **********

                           SUB-AREA RUNOFF COMPUTATION

                     SUBAREA INFLOW HYDROGRAPH FOR TAUNTON LAKE

           ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
            TAUN       0       0       0       0       0       1       0       0

                              HYDROGRAPH DATA
   IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
       1       0    5.70    0.00    5.70    0.00   0.000       0       0       0

                                PRECIP DATA
            SPFE     PMS      R6     R12     R24     R48     R72     R96
            0.00   27.00  100.00  109.00  117.00    0.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS  .800

                                 LOSS DATA
   LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
       0    0.00    0.00    1.00    0.00    0.00    1.00    1.50     .15    0.00    0.00

                           UNIT HYDROGRAPH DATA
                     TC=  4.36      R= 13.54     NTA=  0

                              RECESSION DATA
                  STRTQ=   -1.00    QRCSN=     -.05    RTIOR= 2.00

    UNIT HYDROGRAPH 75 END-OF-PERIOD ORDINATES, LAG=   4.63 HOURS, CP=  .28   VOL= 1.00
       20.      75.     149.     205.     224.     212.     197.     183.     170.     158.
      147.     137.     127.     118.     110.     102.      95.      88.      82.      76.
       71.      66.      61.      57.      53.      49.      46.      42.      39.      37.
       34.      32.      29.      27.      25.      24.      22.      20.      19.      18.
       16.      15.      14.      13.      12.      11.      10.      10.       9.       8.
        8.       7.       7.       6.       6.       5.       5.       5.       4.       4.
        4.       3.       3.       3.       3.       3.       2.       2.       2.       2.
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0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.12	0.00	.12	5.	1.07	7.00	151	0.00	0.00	0.00	0.
1.01	2.00	2	.12	0.00	.12	5.	1.07	8.00	152	0.00	0.00	0.00	0.
1.01	3.00	3	.12	0.00	.12	5.	1.07	9.00	153	0.00	0.00	0.00	0.
1.01	4.00	4	.12	0.00	.12	4.	1.07	10.00	154	0.00	0.00	0.00	0.
1.01	5.00	5	.12	0.00	.12	4.	1.07	11.00	155	0.00	0.00	0.00	0.
1.01	6.00	6	.12	0.00	.12	4.	1.07	12.00	156	0.00	0.00	0.00	0.
1.01	7.00	7	.32	0.00	.32	4.	1.07	13.00	157	0.00	0.00	0.00	0.
1.01	8.00	8	.32	0.00	.32	3.	1.07	14.00	158	0.00	0.00	0.00	0.
1.01	9.00	9	.32	.09	.24	5.	1.07	15.00	159	0.00	0.00	0.00	0.
1.01	10.00	10	.32	.17	.15	13.	1.07	16.00	160	0.00	0.00	0.00	0.
1.01	11.00	11	.32	.17	.15	32.	1.07	17.00	161	0.00	0.00	0.00	0.
1.01	12.00	12	.32	.17	.15	63.	1.07	18.00	162	0.00	0.00	0.00	0.
1.01	13.00	13	2.16	2.01	.15	137.	1.07	19.00	163	0.00	0.00	0.00	0.
1.01	14.00	14	2.59	2.44	.15	323.	1.07	20.00	164	0.00	0.00	0.00	0.
1.01	15.00	15	3.24	3.09	.15	677.	1.07	21.00	165	0.00	0.00	0.00	0.
1.01	16.00	16	8.21	8.06	.15	1302.	1.07	22.00	166	0.00	0.00	0.00	0.
1.01	17.00	17	3.02	2.87	.15	2201.	1.07	23.00	167	0.00	0.00	0.00	0.
1.01	18.00	18	2.38	2.23	.15	3180.	1.08	0.00	168	0.00	0.00	0.00	0.
1.01	19.00	19	.17	.02	.15	3958.	1.08	1.00	169	0.00	0.00	0.00	0.
1.01	20.00	20	.17	.02	.15	4331.	1.08	2.00	170	0.00	0.00	0.00	0.
1.01	21.00	21	.17	.02	.15	4308.	1.08	3.00	171	0.00	0.00	0.00	0.
1.01	22.00	22	.17	.02	.15	4092.	1.08	4.00	172	0.00	0.00	0.00	0.
1.01	23.00	23	.17	.02	.15	3818.	1.08	5.00	173	0.00	0.00	0.00	0.
1.02	0.00	24	.17	.02	.15	3554.	1.08	6.00	174	0.00	0.00	0.00	0.
1.02	1.00	25	0.00	0.00	0.00	3308.	1.08	7.00	175	0.00	0.00	0.00	0.
1.02	2.00	26	0.00	0.00	0.00	3079.	1.08	8.00	176	0.00	0.00	0.00	0.
1.02	3.00	27	0.00	0.00	0.00	2863.	1.08	9.00	177	0.00	0.00	0.00	0.
1.02	4.00	28	0.00	0.00	0.00	2662.	1.08	10.00	178	0.00	0.00	0.00	0.
1.02	5.00	29	0.00	0.00	0.00	2473.	1.08	11.00	179	0.00	0.00	0.00	0.
1.02	6.00	30	0.00	0.00	0.00	2299.	1.08	12.00	180	0.00	0.00	0.00	0.
1.02	7.00	31	0.00	0.00	0.00	2136.	1.08	13.00	181	0.00	0.00	0.00	0.
1.02	8.00	32	0.00	0.00	0.00	1985.	1.08	14.00	182	0.00	0.00	0.00	0.
1.02	9.00	33	0.00	0.00	0.00	1845.	1.08	15.00	183	0.00	0.00	0.00	0.
1.02	10.00	34	0.00	0.00	0.00	1714.	1.08	16.00	184	0.00	0.00	0.00	0.
1.02	11.00	35	0.00	0.00	0.00	1593.	1.08	17.00	185	0.00	0.00	0.00	0.
1.02	12.00	36	0.00	0.00	0.00	1480.	1.08	18.00	186	0.00	0.00	0.00	0.
1.02	13.00	37	0.00	0.00	0.00	1376.	1.08	19.00	187	0.00	0.00	0.00	0.
1.02	14.00	38	0.00	0.00	0.00	1278.	1.08	20.00	188	0.00	0.00	0.00	0.
1.02	15.00	39	0.00	0.00	0.00	1188.	1.08	21.00	189	0.00	0.00	0.00	0.
1.02	16.00	40	0.00	0.00	0.00	1104.	1.08	22.00	190	0.00	0.00	0.00	0.
1.02	17.00	41	0.00	0.00	0.00	1026.	1.08	23.00	191	0.00	0.00	0.00	0.
1.02	18.00	42	0.00	0.00	0.00	953.	1.09	0.00	192	0.00	0.00	0.00	0.
1.02	19.00	43	0.00	0.00	0.00	886.	1.09	1.00	193	0.00	0.00	0.00	0.
1.02	20.00	44	0.00	0.00	0.00	823.	1.09	2.00	194	0.00	0.00	0.00	0.
1.02	21.00	45	0.00	0.00	0.00	765.	1.09	3.00	195	0.00	0.00	0.00	0.
1.02	22.00	46	0.00	0.00	0.00	711.	1.09	4.00	196	0.00	0.00	0.00	0.
1.02	23.00	47	0.00	0.00	0.00	661.	1.09	5.00	197	0.00	0.00	0.00	0.
1.03	0.00	48	0.00	0.00	0.00	614.	1.09	6.00	198	0.00	0.00	0.00	0.
1.03	1.00	49	0.00	0.00	0.00	570.	1.09	7.00	199	0.00	0.00	0.00	0.
1.03	2.00	50	0.00	0.00	0.00	530.	1.09	8.00	200	0.00	0.00	0.00	0.
1.03	3.00	51	0.00	0.00	0.00	493.	1.09	9.00	201	0.00	0.00	0.00	0.
1.03	4.00	52	0.00	0.00	0.00	458.	1.09	10.00	202	0.00	0.00	0.00	0.
1.03	5.00	53	0.00	0.00	0.00	425.	1.09	11.00	203	0.00	0.00	0.00	0.
1.03	6.00	54	0.00	0.00	0.00	395.	1.09	12.00	204	0.00	0.00	0.00	0.
1.03	7.00	55	0.00	0.00	0.00	367.	1.09	13.00	205	0.00	0.00	0.00	0.
1.03	8.00	56	0.00	0.00	0.00	341.	1.09	14.00	206	0.00	0.00	0.00	0.
1.03	9.00	57	0.00	0.00	0.00	317.	1.09	15.00	207	0.00	0.00	0.00	0.
1.03	10.00	58	0.00	0.00	0.00	295.	1.09	16.00	208	0.00	0.00	0.00	0.
1.03	11.00	59	0.00	0.00	0.00	274.	1.09	17.00	209	0.00	0.00	0.00	0.
1.03	12.00	60	0.00	0.00	0.00	255.	1.09	18.00	210	0.00	0.00	0.00	0.
1.03	13.00	61	0.00	0.00	0.00	237.	1.09	19.00	211	0.00	0.00	0.00	0.

1.03	15.00	63	0.00	0.00	0.00	205.	1.09	21.00	213	0.00	0.00	0.00	0.
1.03	16.00	64	0.00	0.00	0.00	191.	1.09	22.00	214	0.00	0.00	0.00	0.
1.03	17.00	65	0.00	0.00	0.00	179.	1.09	23.00	215	0.00	0.00	0.00	0.
1.03	18.00	66	0.00	0.00	0.00	167.	1.10	0.00	216	0.00	0.00	0.00	0.
1.03	19.00	67	0.00	0.00	0.00	155.	1.10	1.00	217	0.00	0.00	0.00	0.
1.03	20.00	68	0.00	0.00	0.00	145.	1.10	2.00	218	0.00	0.00	0.00	0.
1.03	21.00	69	0.00	0.00	0.00	135.	1.10	3.00	219	0.00	0.00	0.00	0.
1.03	22.00	70	0.00	0.00	0.00	126.	1.10	4.00	220	0.00	0.00	0.00	0.
1.03	23.00	71	0.00	0.00	0.00	118.	1.10	5.00	221	0.00	0.00	0.00	0.
1.04	0.00	72	0.00	0.00	0.00	110.	1.10	6.00	222	0.00	0.00	0.00	0.
1.04	1.00	73	0.00	0.00	0.00	103.	1.10	7.00	223	0.00	0.00	0.00	0.
1.04	2.00	74	0.00	0.00	0.00	96.	1.10	8.00	224	0.00	0.00	0.00	0.
1.04	3.00	75	0.00	0.00	0.00	89.	1.10	9.00	225	0.00	0.00	0.00	0.
1.04	4.00	76	0.00	0.00	0.00	83.	1.10	10.00	226	0.00	0.00	0.00	0.
1.04	5.00	77	0.00	0.00	0.00	78.	1.10	11.00	227	0.00	0.00	0.00	0.
1.04	6.00	78	0.00	0.00	0.00	73.	1.10	12.00	228	0.00	0.00	0.00	0.
1.04	7.00	79	0.00	0.00	0.00	68.	1.10	13.00	229	0.00	0.00	0.00	0.
1.04	8.00	80	0.00	0.00	0.00	63.	1.10	14.00	230	0.00	0.00	0.00	0.
1.04	9.00	81	0.00	0.00	0.00	59.	1.10	15.00	231	0.00	0.00	0.00	0.
1.04	10.00	82	0.00	0.00	0.00	55.	1.10	16.00	232	0.00	0.00	0.00	0.
1.04	11.00	83	0.00	0.00	0.00	51.	1.10	17.00	233	0.00	0.00	0.00	0.
1.04	12.00	84	0.00	0.00	0.00	48.	1.10	18.00	234	0.00	0.00	0.00	0.
1.04	13.00	85	0.00	0.00	0.00	45.	1.10	19.00	235	0.00	0.00	0.00	0.
1.04	14.00	86	0.00	0.00	0.00	42.	1.10	20.00	236	0.00	0.00	0.00	0.
1.04	15.00	87	0.00	0.00	0.00	39.	1.10	21.00	237	0.00	0.00	0.00	0.
1.04	16.00	88	0.00	0.00	0.00	36.	1.10	22.00	238	0.00	0.00	0.00	0.
1.04	17.00	89	0.00	0.00	0.00	34.	1.10	23.00	239	0.00	0.00	0.00	0.
1.04	18.00	90	0.00	0.00	0.00	32.	1.11	0.00	240	0.00	0.00	0.00	0.
1.04	19.00	91	0.00	0.00	0.00	29.	1.11	1.00	241	0.00	0.00	0.00	0.
1.04	20.00	92	0.00	0.00	0.00	27.	1.11	2.00	242	0.00	0.00	0.00	0.
1.04	21.00	93	0.00	0.00	0.00	26.	1.11	3.00	243	0.00	0.00	0.00	0.
1.04	22.00	94	0.00	0.00	0.00	24.	1.11	4.00	244	0.00	0.00	0.00	0.
1.04	23.00	95	0.00	0.00	0.00	22.	1.11	5.00	245	0.00	0.00	0.00	0.
1.05	0.00	96	0.00	0.00	0.00	21.	1.11	6.00	246	0.00	0.00	0.00	0.
1.05	1.00	97	0.00	0.00	0.00	19.	1.11	7.00	247	0.00	0.00	0.00	0.
1.05	2.00	98	0.00	0.00	0.00	18.	1.11	8.00	248	0.00	0.00	0.00	0.
1.05	3.00	99	0.00	0.00	0.00	17.	1.11	9.00	249	0.00	0.00	0.00	0.
1.05	4.00	100	0.00	0.00	0.00	16.	1.11	10.00	250	0.00	0.00	0.00	0.
1.05	5.00	101	0.00	0.00	0.00	15.	1.11	11.00	251	0.00	0.00	0.00	0.
1.05	6.00	102	0.00	0.00	0.00	14.	1.11	12.00	252	0.00	0.00	0.00	0.
1.05	7.00	103	0.00	0.00	0.00	13.	1.11	13.00	253	0.00	0.00	0.00	0.
1.05	8.00	104	0.00	0.00	0.00	12.	1.11	14.00	254	0.00	0.00	0.00	0.
1.05	9.00	105	0.00	0.00	0.00	11.	1.11	15.00	255	0.00	0.00	0.00	0.
1.05	10.00	106	0.00	0.00	0.00	10.	1.11	16.00	256	0.00	0.00	0.00	0.
1.05	11.00	107	0.00	0.00	0.00	10.	1.11	17.00	257	0.00	0.00	0.00	0.
1.05	12.00	108	0.00	0.00	0.00	9.	1.11	18.00	258	0.00	0.00	0.00	0.
1.05	13.00	109	0.00	0.00	0.00	8.	1.11	19.00	259	0.00	0.00	0.00	0.
1.05	14.00	110	0.00	0.00	0.00	8.	1.11	20.00	260	0.00	0.00	0.00	0.
1.05	15.00	111	0.00	0.00	0.00	7.	1.11	21.00	261	0.00	0.00	0.00	0.
1.05	16.00	112	0.00	0.00	0.00	7.	1.11	22.00	262	0.00	0.00	0.00	0.
1.05	17.00	113	0.00	0.00	0.00	6.	1.11	23.00	263	0.00	0.00	0.00	0.
1.05	18.00	114	0.00	0.00	0.00	6.	1.12	0.00	264	0.00	0.00	0.00	0.
1.05	19.00	115	0.00	0.00	0.00	6.	1.12	1.00	265	0.00	0.00	0.00	0.
1.05	20.00	116	0.00	0.00	0.00	5.	1.12	2.00	266	0.00	0.00	0.00	0.
1.05	21.00	117	0.00	0.00	0.00	5.	1.12	3.00	267	0.00	0.00	0.00	0.
1.05	22.00	118	0.00	0.00	0.00	5.	1.12	4.00	268	0.00	0.00	0.00	0.
1.05	23.00	119	0.00	0.00	0.00	4.	1.12	5.00	269	0.00	0.00	0.00	0.
1.06	0.00	120	0.00	0.00	0.00	4.	1.12	6.00	270	0.00	0.00	0.00	0.
1.06	1.00	121	0.00	0.00	0.00	4.	1.12	7.00	271	0.00	0.00	0.00	0.
1.06	2.00	122	0.00	0.00	0.00	3.	1.12	8.00	272	0.00	0.00	0.00	0.
1.06	3.00	123	0.00	0.00	0.00	3.	1.12	9.00	273	0.00	0.00	0.00	0.
1.06	4.00	124	0.00	0.00	0.00	3.	1.12	10.00	274	0.00	0.00	0.00	0.
1.06	5.00	125	0.00	0.00	0.00	3.	1.12	11.00	275	0.00	0.00	0.00	0.
1.06	6.00	126	0.00	0.00	0.00	3.	1.12	12.00	276	0.00	0.00	0.00	0.
1.06	7.00	127	0.00	0.00	0.00	2.	1.12	13.00	277	0.00	0.00	0.00	0.
1.06	8.00	128	0.00	0.00	0.00	2.	1.12	14.00	278	0.00	0.00	0.00	0.
1.06	9.00	129	0.00	0.00	0.00	2.	1.12	15.00	279	0.00	0.00	0.00	0.
1.06	10.00	130	0.00	0.00	0.00	2.	1.12	16.00	280	0.00	0.00	0.00	0.

1.06	11.00	131	0.00	0.00	0.00	2.	1.12	17.00	281	0.00	0.00	0.00	0.
1.06	12.00	132	0.00	0.00	0.00	2.	1.12	18.00	282	0.00	0.00	0.00	0.
1.06	13.00	133	0.00	0.00	0.00	2.	1.12	19.00	283	0.00	0.00	0.00	0.
1.06	14.00	134	0.00	0.00	0.00	1.	1.12	20.00	284	0.00	0.00	0.00	0.
1.06	15.00	135	0.00	0.00	0.00	1.	1.12	21.00	285	0.00	0.00	0.00	0.
1.06	16.00	136	0.00	0.00	0.00	1.	1.12	22.00	286	0.00	0.00	0.00	0.
1.06	17.00	137	0.00	0.00	0.00	1.	1.12	23.00	287	0.00	0.00	0.00	0.
1.06	18.00	138	0.00	0.00	0.00	1.	1.13	0.00	288	0.00	0.00	0.00	0.
1.06	19.00	139	0.00	0.00	0.00	1.	1.13	1.00	289	0.00	0.00	0.00	0.
1.06	20.00	140	0.00	0.00	0.00	1.	1.13	2.00	290	0.00	0.00	0.00	0.
1.06	21.00	141	0.00	0.00	0.00	1.	1.13	3.00	291	0.00	0.00	0.00	0.
1.06	22.00	142	0.00	0.00	0.00	1.	1.13	4.00	292	0.00	0.00	0.00	0.
1.06	23.00	143	0.00	0.00	0.00	1.	1.13	5.00	293	0.00	0.00	0.00	0.
1.07	0.00	144	0.00	0.00	0.00	1.	1.13	6.00	294	0.00	0.00	0.00	0.
1.07	1.00	145	0.00	0.00	0.00	1.	1.13	7.00	295	0.00	0.00	0.00	0.
1.07	2.00	146	0.00	0.00	0.00	1.	1.13	8.00	296	0.00	0.00	0.00	0.
1.07	3.00	147	0.00	0.00	0.00	1.	1.13	9.00	297	0.00	0.00	0.00	0.
1.07	4.00	148	0.00	0.00	0.00	1.	1.13	10.00	298	0.00	0.00	0.00	0.
1.07	5.00	149	0.00	0.00	0.00	1.	1.13	11.00	299	0.00	0.00	0.00	0.
1.07	6.00	150	0.00	0.00	0.00	0.	1.13	12.00	300	0.00	0.00	0.00	0.

SUM	25.27	21.45	3.83	79095.
	(642.)	(545.)	(97.)	(2239.72)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4331.	3981.	2581.	1087.	79099.
CMS	123.	113.	73.	31.	2240.
INCHES		6.50	16.85	21.30	21.51
MM		165.01	427.89	540.92	546.47
AC-FT		1974.	5119.	6471.	6537.
THOUS CU M		2435.	6314.	7981.	8063.

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                    HYDROGRAPH AT STA   TAUN FOR PLAN 1, RTIO 1

                     PEAK    6-HOUR    24-HOUR    72-HOUR   TOTAL VOLUME
            CFS     2165.     1990.      1290.       544.         39549.
            CMS       61.       56.        37.        15.          1120.
         INCHES                3.25       8.42      10.65          10.76
             MM               82.51     21 .94     270.46         273.24
          AC-FT                987.      2559.      3235.          3269.
     THOUS CU M               1217.      3157.      3991.          4032.

**********      **********      **********      **********      **********

                         SUB-AREA RUNOFF COMPUTATION

                  SUBAREA INFLOW HYDROGRAPH FOR CENTENNIAL LAKE

              ISTAQ   ICOMP   IECON   ITAPE   JPLT   JPRT   INAME  ISTAGE  IAUTO
               CENT       0       0       0      0      0       1       0      0

                                  HYDROGRAPH DATA
      IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC    RATIO   ISNOW   ISAME   LOCAL
          1       0    7.30    0.00    7.30    0.00    0.000       0       1       0

                                   PRECIP DATA
             SPFE     PMS      R6     R12     R24      R48     R72     R96
             0.00   27.00  100.00  109.00  117.00     0.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS  .800

                                    LOSS DATA
    LROPT  STRKR  DLTKR  RTIOL  ERAIN  STRKS  RTIOK  STRTL  CNSTL  ALSMX  RTIMP
        0   0.00   0.00   1.00   0.00   0.00   1.00   1.50    .15   0.00   0.00

                              UNIT HYDROGRAPH DATA
                        TC=  8.70     R= 27.70     NTA=  0

                                  RECESSION DATA
                  STRTQ=   -1.00    QRCSN=    -.05     RTIOR= 2.00

     UNIT HYDROGRAPH100 END-OF-PERIOD ORDINATES, LAG=   8.93 HOURS, CP=  .27  VOL=  .97
      5.     17.     36.     59.     83.    107.    125.    139.    144.    142.
    137.    132.    127.    123.    118.    114.    110.    106.    102.     99.
     95.     92.     89.     85.     82.     79.     77.     74.     71.     69.
     66.     64.     62.     60.     57.     55.     53.     52.     50.     48.
     46.     45.     43.     41.     40.     39.     37.     36.     35.     33.
     32.     31.     30.     29.     28.     27.     26.     25.     24.     23.
     22.     22.     21.     20.     19.     19.     18.     17.     17.     16.
     16.     15.     15.     14.     14.     13.     13.     12.     12.     11.
     11.     11.     10.     10.      9.      9.      9.      8.      8.      8.
      8.      7.      7.      7.      7.      6.      6.      6.      6.      5.
```

END-OF-PERIOD FLOW

0

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.12	0.00	.12	7.	1.07	7.00	151	0.00	0.00	0.00	8.
1.01	2.00	2	.12	0.00	.12	6.	1.07	8.00	152	0.00	0.00	0.00	8.
1.01	3.00	3	.12	0.00	.12	6.	1.07	9.00	153	0.00	0.00	0.00	7.
1.01	4.00	4	.12	0.00	.12	6.	1.07	10.00	154	0.00	0.00	0.00	7.
1.01	5.00	5	.12	0.00	.12	5.	1.07	11.00	155	0.00	0.00	0.00	6.
1.01	6.00	6	.12	0.00	.12	5.	1.07	12.00	156	0.00	0.00	0.00	6.
1.01	7.00	7	.32	0.00	.32	4.	1.07	13.00	157	0.00	0.00	0.00	6.
1.01	8.00	8	.32	0.00	.32	4.	1.07	14.00	158	0.00	0.00	0.00	5.
1.01	9.00	9	.32	.09	.24	4.	1.07	15.00	159	0.00	0.00	0.00	5.
1.01	10.00	10	.32	.17	.15	6.	1.07	16.00	160	0.00	0.00	0.00	5.
1.01	11.00	11	.32	.17	.15	10.	1.07	17.00	161	0.00	0.00	0.00	4.
1.01	12.00	12	.32	.17	.15	18.	1.07	18.00	162	0.00	0.00	0.00	4.
1.01	13.00	13	2.16	2.01	.15	39.	1.07	19.00	163	0.00	0.00	0.00	4.
1.01	14.00	14	2.59	2.44	.15	89.	1.07	20.00	164	0.00	0.00	0.00	3.
1.01	15.00	15	3.24	3.09	.15	186.	1.07	21.00	165	0.00	0.00	0.00	3.
1.01	16.00	16	8.21	8.06	.15	357.	1.07	22.00	166	0.00	0.00	0.00	3.
1.01	17.00	17	3.02	2.87	.15	656.	1.07	23.00	167	0.00	0.00	0.00	3.
1.01	18.00	18	2.38	2.23	.15	1037.	1.08	0.00	168	0.00	0.00	0.00	3.
1.01	19.00	19	.17	.02	.15	1474.	1.08	1.00	169	0.00	0.00	0.00	2.
1.01	20.00	20	.17	.02	.15	1923.	1.08	2.00	170	0.00	0.00	0.00	2.
1.01	21.00	21	.17	.02	.15	2332.	1.08	3.00	171	0.00	0.00	0.00	2.
1.01	22.00	22	.17	.02	.15	2652.	1.08	4.00	172	0.00	0.00	0.00	2.
1.01	23.00	23	.17	.02	.15	2864.	1.08	5.00	173	0.00	0.00	0.00	2.
1.02	0.00	24	.17	.02	.15	2957.	1.08	6.00	174	0.00	0.00	0.00	2.
1.02	1.00	25	0.00	0.00	0.00	2945.	1.08	7.00	175	0.00	0.00	0.00	2.
1.02	2.00	26	0.00	0.00	0.00	2874.	1.08	8.00	176	0.00	0.00	0.00	1.
1.02	3.00	27	0.00	0.00	0.00	2781.	1.08	9.00	177	0.00	0.00	0.00	1.
1.02	4.00	28	0.00	0.00	0.00	2685.	1.08	10.00	178	0.00	0.00	0.00	1.
1.02	5.00	29	0.00	0.00	0.00	2592.	1.08	11.00	179	0.00	0.00	0.00	1.
1.02	6.00	30	0.00	0.00	0.00	2501.	1.08	12.00	180	0.00	0.00	0.00	1.
1.02	7.00	31	0.00	0.00	0.00	2413.	1.08	13.00	181	0.00	0.00	0.00	1.
1.02	8.00	32	0.00	0.00	0.00	2328.	1.08	14.00	182	0.00	0.00	0.00	1.
1.02	9.00	33	0.00	0.00	0.00	2245.	1.08	15.00	183	0.00	0.00	0.00	1.
1.02	10.00	34	0.00	0.00	0.00	2156.	1.08	16.00	184	0.00	0.00	0.00	1.
1.02	11.00	35	0.00	0.00	0.00	2089.	1.08	17.00	185	0.00	0.00	0.00	1.
1.02	12.00	36	0.00	0.00	0.00	2015.	1.08	18.00	186	0.00	0.00	0.00	1.
1.02	13.00	37	0.00	0.00	0.00	1943.	1.08	19.00	187	0.00	0.00	0.00	1.
1.02	14.00	38	0.00	0.00	0.00	1874.	1.08	20.00	188	0.00	0.00	0.00	1.
1.02	15.00	39	0.00	0.00	0.00	1808.	1.08	21.00	189	0.00	0.00	0.00	1.
1.02	16.00	40	0.00	0.00	0.00	1744.	1.08	22.00	190	0.00	0.00	0.00	1.
1.02	17.00	41	0.00	0.00	0.00	1682.	1.08	23.00	191	0.00	0.00	0.00	1.
1.02	18.00	42	0.00	0.00	0.00	1622.	1.09	0.00	192	0.00	0.00	0.00	0.
1.02	19.00	43	0.00	0.00	0.00	1565.	1.09	1.00	193	0.00	0.00	0.00	0.
1.02	20.00	44	0.00	0.00	0.00	1509.	1.09	2.00	194	0.00	0.00	0.00	0.
1.02	21.00	45	0.00	0.00	0.00	1456.	1.09	3.00	195	0.00	0.00	0.00	0.
1.02	22.00	46	0.00	0.00	0.00	1404.	1.09	4.00	196	0.00	0.00	0.00	0.
1.02	23.00	47	0.00	0.00	0.00	1354.	1.09	5.00	197	0.00	0.00	0.00	0.
1.03	0.00	48	0.00	0.00	0.00	1306.	1.09	6.00	198	0.00	0.00	0.00	0.
1.03	1.00	49	0.00	0.00	0.00	1260.	1.09	7.00	199	0.00	0.00	0.00	0.
1.03	2.00	50	0.00	0.00	0.00	1215.	1.09	8.00	200	0.00	0.00	0.00	0.
1.03	3.00	51	0.00	0.00	0.00	1172.	1.09	9.00	201	0.00	0.00	0.00	0.
1.03	4.00	52	0.00	0.00	0.00	1130.	1.09	10.00	202	0.00	0.00	0.00	0.
1.03	5.00	53	0.00	0.00	0.00	1090.	1.09	11.00	203	0.00	0.00	0.00	0.
1.03	6.00	54	0.00	0.00	0.00	1052.	1.09	12.00	204	0.00	0.00	0.00	0.
1.03	7.00	55	0.00	0.00	0.00	1014.	1.09	13.00	205	0.00	0.00	0.00	0.
1.03	8.00	56	0.00	0.00	0.00	978.	1.09	14.00	206	0.00	0.00	0.00	0.
1.03	9.00	57	0.00	0.00	0.00	944.	1.09	15.00	207	0.00	0.00	0.00	0.
1.03	10.00	58	0.00	0.00	0.00	910.	1.09	16.00	208	0.00	0.00	0.00	0.
1.03	11.00	59	0.00	0.00	0.00	878.	1.09	17.00	209	0.00	0.00	0.00	0.
1.03	12.00	60	0.00	0.00	0.00	847.	1.09	18.00	210	0.00	0.00	0.00	0.
1.03	13.00	61	0.00	0.00	0.00	817.	1.09	19.00	211	0.00	0.00	0.00	0.
1.03	14.00	62	0.00	0.00	0.00	788.	1.09	20.00	212	0.00	0.00	0.00	0.
1.03	15.00	63	0.00	0.00	0.00	760.	1.09	21.00	213	0.00	0.00	0.00	0.
1.03	16.00	64	0.00	0.00	0.00	733.	1.09	22.00	214	0.00	0.00	0.00	0.
1.03	17.00	65	0.00	0.00	0.00	707.	1.09	23.00	215	0.00	0.00	0.00	0.
1.03	18.00	66	0.00	0.00	0.00	682.	1.10	0.00	216	0.00	0.00	0.00	0.
1.03	19.00	67	0.00	0.00	0.00	658.	1.10	1.00	217	0.00	0.00	0.00	0.
1.03	20.00	68	0.00	0.00	0.00	634.	1.10	2.00	218	0.00	0.00	0.00	0.
1.03	21.00	69	0.00	0.00	0.00	612.	1.10	3.00	219	0.00	0.00	0.00	0.
1.03	22.00	70	0.00	0.00	0.00	590.	1.10	4.00	220	0.00	0.00	0.00	0.
1.03	23.00	71	0.00	0.00	0.00	569.	1.10	5.00	221	0.00	0.00	0.00	0.
1.04	0.00	72	0.00	0.00	0.00	549.	1.10	6.00	222	0.00	0.00	0.00	0.

1.04	2.00	74	0.00	0.00	0.00	511.	1.10	8.00	224	0.00	0.00	0.00	0.
1.04	3.00	75	0.00	0.00	0.00	493.	1.10	9.00	225	0.00	0.00	0.00	0.
1.04	4.00	76	0.00	0.00	0.00	475.	1.10	10.00	226	0.00	0.00	0.00	0.
1.04	5.00	77	0.00	0.00	0.00	458.	1.10	11.00	227	0.00	0.00	0.00	0.
1.04	6.00	78	0.00	0.00	0.00	442.	1.10	12.00	228	0.00	0.00	0.00	0.
1.04	7.00	79	0.00	0.00	0.00	426.	1.10	13.00	229	0.00	0.00	0.00	0.
1.04	8.00	80	0.00	0.00	0.00	411.	1.10	14.00	230	0.00	0.00	0.00	0.
1.04	9.00	81	0.00	0.00	0.00	397.	1.10	15.00	231	0.00	0.00	0.00	0.
1.04	10.00	82	0.00	0.00	0.00	383.	1.10	16.00	232	0.00	0.00	0.00	0.
1.04	11.00	83	0.00	0.00	0.00	369.	1.10	17.00	233	0.00	0.00	0.00	0.
1.04	12.00	84	0.00	0.00	0.00	356.	1.10	18.00	234	0.00	0.00	0.00	0.
1.04	13.00	85	0.00	0.00	0.00	343.	1.10	19.00	235	0.00	0.00	0.00	0.
1.04	14.00	86	0.00	0.00	0.00	331.	1.10	20.00	236	0.00	0.00	0.00	0.
1.04	15.00	87	0.00	0.00	0.00	319.	1.10	21.00	237	0.00	0.00	0.00	0.
1.04	16.00	88	0.00	0.00	0.00	308.	1.10	22.00	238	0.00	0.00	0.00	0.
1.04	17.00	89	0.00	0.00	0.00	297.	1.10	23.00	239	0.00	0.00	0.00	0.
1.04	18.00	90	0.00	0.00	0.00	287.	1.11	0.00	240	0.00	0.00	0.00	0.
1.04	19.00	91	0.00	0.00	0.00	276.	1.11	1.00	241	0.00	0.00	0.00	0.
1.04	20.00	92	0.00	0.00	0.00	267.	1.11	2.00	242	0.00	0.00	0.00	0.
1.04	21.00	93	0.00	0.00	0.00	257.	1.11	3.00	243	0.00	0.00	0.00	0.
1.04	22.00	94	0.00	0.00	0.00	248.	1.11	4.00	244	0.00	0.00	0.00	0.
1.04	23.00	95	0.00	0.00	0.00	239.	1.11	5.00	245	0.00	0.00	0.00	0.
1.05	0.00	96	0.00	0.00	0.00	231.	1.11	6.00	246	0.00	0.00	0.00	0.
1.05	1.00	97	0.00	0.00	0.00	223.	1.11	7.00	247	0.00	0.00	0.00	0.
1.05	2.00	98	0.00	0.00	0.00	215.	1.11	8.00	248	0.00	0.00	0.00	0.
1.05	3.00	99	0.00	0.00	0.00	207.	1.11	9.00	249	0.00	0.00	0.00	0.
1.05	4.00	100	0.00	0.00	0.00	200.	1.11	10.00	250	0.00	0.00	0.00	0.
1.05	5.00	101	0.00	0.00	0.00	193.	1.11	11.00	251	0.00	0.00	0.00	0.
1.05	6.00	102	0.00	0.00	0.00	186.	1.11	12.00	252	0.00	0.00	0.00	0.
1.05	7.00	103	0.00	0.00	0.00	179.	1.11	13.00	253	0.00	0.00	0.00	0.
1.05	8.00	104	0.00	0.00	0.00	173.	1.11	14.00	254	0.00	0.00	0.00	0.
1.05	9.00	105	0.00	0.00	0.00	167.	1.11	15.00	255	0.00	0.00	0.00	0.
1.05	10.00	106	0.00	0.00	0.00	161.	1.11	16.00	256	0.00	0.00	0.00	0.
1.05	11.00	107	0.00	0.00	0.00	155.	1.11	17.00	257	0.00	0.00	0.00	0.
1.05	12.00	108	0.00	0.00	0.00	150.	1.11	18.00	258	0.00	0.00	0.00	0.
1.05	13.00	109	0.00	0.00	0.00	144.	1.11	19.00	259	0.00	0.00	0.00	0.
1.05	14.00	110	0.00	0.00	0.00	138.	1.11	20.00	260	0.00	0.00	0.00	0.
1.05	15.00	111	0.00	0.00	0.00	132.	1.11	21.00	261	0.00	0.00	0.00	0.
1.05	16.00	112	0.00	0.00	0.00	126.	1.11	22.00	262	0.00	0.00	0.00	0.
1.05	17.00	113	0.00	0.00	0.00	118.	1.11	23.00	263	0.00	0.00	0.00	0.
1.05	18.00	114	0.00	0.00	0.00	110.	1.12	0.00	264	0.00	0.00	0.00	0.
1.05	19.00	115	0.00	0.00	0.00	103.	1.12	1.00	265	0.00	0.00	0.00	0.
1.05	20.00	116	0.00	0.00	0.00	96.	1.12	2.00	266	0.00	0.00	0.00	0.
1.05	21.00	117	0.00	0.00	0.00	89.	1.12	3.00	267	0.00	0.00	0.00	0.
1.05	22.00	118	0.00	0.00	0.00	83.	1.12	4.00	268	0.00	0.00	0.00	0.
1.05	23.00	119	0.00	0.00	0.00	78.	1.12	5.00	269	0.00	0.00	0.00	0.
1.06	0.00	120	0.00	0.00	0.00	73.	1.12	6.00	270	0.00	0.00	0.00	0.
1.06	1.00	121	0.00	0.00	0.00	58.	1.12	7.00	271	0.00	0.00	0.00	0.
1.06	2.00	122	0.00	0.00	0.00	63.	1.12	8.00	272	0.00	0.00	0.00	0.
1.06	3.00	123	0.00	0.00	0.00	59.	1.12	9.00	273	0.00	0.00	0.00	0.
1.06	4.00	124	0.00	0.00	0.00	55.	1.12	10.00	274	0.00	0.00	0.00	0.

1.06	6.00	126	0.00	0.00	0.00	48.	1.12	12.00	276	0.00	0.00	0.00	0.
1.06	7.00	127	0.00	0.00	0.00	45.	1.12	13.00	277	0.00	0.00	0.00	0.
1.06	8.00	128	0.00	0.00	0.00	42.	1.12	14.00	278	0.00	0.00	0.00	0.
1.06	9.00	129	0.00	0.00	0.00	39.	1.12	15.00	279	0.00	0.00	0.00	0.
1.06	10.00	130	0.00	0.00	0.00	36.	1.12	16.00	280	0.00	0.00	0.00	0.
1.06	11.00	131	0.00	0.00	0.00	34.	1.12	17.00	281	0.00	0.00	0.00	0.
1.06	12.00	132	0.00	0.00	0.00	32.	1.12	18.00	282	0.00	0.00	0.00	0.
1.06	13.00	133	0.00	0.00	0.00	29.	1.12	19.00	283	0.00	0.00	0.00	0.
1.06	14.00	134	0.00	0.00	0.00	28.	1.12	20.00	284	0.00	0.00	0.00	0.
1.06	15.00	135	0.00	0.00	0.00	26.	1.12	21.00	285	0.00	0.00	0.00	0.
1.06	16.00	136	0.00	0.00	0.00	24.	1.12	22.00	286	0.00	0.00	0.00	0.
1.06	17.00	137	0.00	0.00	0.00	22.	1.12	23.00	287	0.00	0.00	0.00	0.
1.06	18.00	138	0.00	0.00	0.00	21.	1.13	0.00	288	0.00	0.00	0.00	0.
1.06	19.00	139	0.00	0.00	0.00	19.	1.13	1.00	289	0.00	0.00	0.00	0.
1.06	20.00	140	0.00	0.00	0.00	18.	1.13	2.00	290	0.00	0.00	0.00	0.
1.06	21.00	141	0.00	0.00	0.00	17.	1.13	3.00	291	0.00	0.00	0.00	0.
1.06	22.00	142	0.00	0.00	0.00	16.	1.13	4.00	292	0.00	0.00	0.00	0.
1.05	23.00	143	0.00	0.00	0.00	15.	1.13	5.00	293	0.00	0.00	0.00	0.
1.07	0.00	144	0.00	0.00	0.00	14.	1.13	6.00	294	0.00	0.00	0.00	0.
1.07	1.00	145	0.00	0.00	0.00	13.	1.13	7.00	295	0.00	0.00	0.00	0.
1.07	2.00	146	0.00	0.00	0.00	12.	1.13	8.00	296	0.00	0.00	0.00	0.
1.07	3.00	147	0.00	0.00	0.00	11.	1.13	9.00	297	0.00	0.00	0.00	0.
1.07	4.00	148	0.00	0.00	0.00	10.	1.13	10.00	298	0.00	0.00	0.00	0.
1.07	5.00	149	0.00	0.00	0.00	10.	1.13	11.00	299	0.00	0.00	0.00	0.
1.07	6.00	150	0.00	0.00	0.00	9.	1.13	12.00	300	0.00	0.00	0.00	0.
									SUM	25.27	21.45	3.83	99306.
										(642.)	(545.)	(97.)	(2812.03)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2957.	2849.	2273.	1277.	99310.
CMS	84.	81.	64.	36.	2812.
INCHES		3.63	11.59	19.53	21.09
MM		92.20	294.29	496.12	535.73
AC-FT		1412.	4509.	7601.	8207.
THOUS CU M		1742.	5561.	9375.	10124.

HYDROGRAPH AT STA CENT FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1478.	1424.	1137.	639.	49655.
CMS	42.	40.	32.	18.	1406.
INCHES		1.81	5.79	9.77	10.55
MM		46.10	147.15	248.06	267.86
AC-FT		706.	2254.	3800.	4104.
THOUS CU M		871.	2781.	4588.	5062.

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HYDROGRAPH ROUTING

ROUTED DISCHARGE THROUGH CENTENNIAL LAKE DAM

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	TAUN	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-60.	-1

STAGE	59.60	60.00	60.50	61.00	61.50	62.00	62.50	63.00	63.50	64.00
	64.50	65.00	65.50	66.00	67.00	68.00	69.00	70.00		
FLOW	0.00	9.00	30.00	58.00	93.00	132.00	176.00	202.00	222.00	241.00
	256.00	270.00	307.00	428.00	451.00	475.00	496.00	517.00		

CAPACITY=	0.	334.	358.	1244.
ELEVATION=	48.	60.	60.	70.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
59.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
66.0	2.6	1.5	300.

STATION TAUN, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	3.	0.	334.	59.6
1.01	2.00	2	2.00	3.	0.	335.	59.6
1.01	3.00	3	3.00	3.	0.	335.	59.6
1.01	4.00	4	4.00	3.	0.	335.	59.6
1.01	5.00	5	5.00	3.	0.	335.	59.6
1.01	6.00	6	6.00	2.	0.	335.	59.6
1.01	7.00	7	7.00	2.	1.	335.	59.6
1.01	8.00	8	8.00	2.	1.	336.	59.6
1.01	9.00	9	9.00	2.	1.	336.	59.6
1.01	10.00	10	10.00	3.	1.	336.	59.6
1.01	11.00	11	11.00	5.	1.	336.	59.6
1.01	12.00	12	12.00	9.	1.	337.	59.6
1.01	13.00	13	13.00	20.	1.	338.	59.7
1.01	14.00	14	14.00	45.	2.	340.	59.7
1.01	15.00	15	15.00	93.	4.	346.	59.8
1.01	16.00	16	16.00	183.	8.	356.	60.0
1.01	17.00	17	17.00	328.	18.	376.	60.2
1.01	18.00	18	18.00	518.	34.	409.	60.6
1.01	19.00	19	19.00	737.	56.	457.	61.1
1.01	20.00	20	20.00	962.	118.	520.	61.8
1.01	21.00	21	21.00	1166.	195.	595.	62.7
1.01	22.00	22	22.00	1326.	227.	681.	63.6
1.01	23.00	23	23.00	1432.	262.	775.	64.7
1.02	0.00	24	24.00	1478.	371.	869.	65.8
1.02	1.00	25	25.00	1473.	803.	942.	66.6
1.02	2.00	26	26.00	1437.	1239.	978.	67.0
1.02	3.00	27	27.00	1391.	1367.	987.	67.1
1.02	4.00	28	28.00	1343.	1367.	987.	67.1
1.02	5.00	29	29.00	1296.	1332.	985.	67.1
1.02	6.00	30	30.00	1251.	1289.	982.	67.0
1.02	7.00	31	31.00	1206.	1245.	979.	67.0
1.02	8.00	32	32.00	1164.	1202.	975.	67.0
1.02	9.00	33	33.00	1123.	1161.	972.	66.9
1.02	10.00	34	34.00	1083.	1120.	969.	66.9
1.02	11.00	35	35.00	1044.	1081.	966.	66.9
1.02	12.00	36	36.00	1007.	1044.	963.	66.8
1.02	13.00	37	37.00	972.	1007.	960.	66.8
1.02	14.00	38	38.00	937.	972.	957.	66.8
1.02	15.00	39	39.00	904.	939.	954.	66.7
1.02	16.00	40	40.00	872.	[illegible]	[illegible]	66.7

1.02	17.00	41	41.00	841.	875.	949.	66.7
1.02	18.00	42	42.00	811.	844.	946.	66.6
1.02	19.00	43	43.00	782.	815.	943.	66.6
1.02	20.00	44	44.00	755.	787.	941.	66.6
1.02	21.00	45	45.00	728.	760.	938.	66.5
1.02	22.00	46	46.00	702.	734.	935.	66.5
1.02	23.00	47	47.00	677.	709.	933.	66.5
1.03	0.00	48	48.00	653.	684.	930.	66.5
1.03	1.00	49	49.00	630.	651.	928.	66.4
1.03	2.00	50	50.00	608.	639.	925.	66.4
1.03	3.00	51	51.00	586.	617.	923.	66.4
1.03	4.00	52	52.00	565.	596.	920.	66.3
1.03	5.00	53	53.00	545.	576.	918.	66.3
1.03	6.00	54	54.00	526.	557.	915.	66.3
1.03	7.00	55	55.00	507.	539.	913.	66.3
1.03	8.00	56	56.00	489.	521.	910.	66.2
1.03	9.00	57	57.00	472.	504.	908.	66.2
1.03	10.00	58	58.00	455.	488.	905.	66.2
1.03	11.00	59	59.00	439.	473.	902.	66.1
1.03	12.00	60	60.00	423.	459.	899.	66.1
1.03	13.00	61	61.00	408.	447.	896.	66.1
1.03	14.00	62	62.00	394.	435.	893.	66.0
1.03	15.00	63	63.00	380.	428.	889.	66.0
1.03	16.00	64	64.00	366.	417.	885.	66.0
1.03	17.00	65	65.00	353.	405.	881.	65.9
1.03	18.00	66	66.00	341.	393.	877.	65.9
1.03	19.00	67	67.00	329.	381.	873.	65.8
1.03	20.00	68	68.00	317.	370.	868.	65.8
1.03	21.00	69	69.00	305.	358.	864.	65.7
1.03	22.00	70	70.00	295.	346.	860.	65.7
1.03	23.00	71	71.00	285.	335.	856.	65.6
1.04	0.00	72	72.00	275.	324.	851.	65.6
1.04	1.00	73	73.00	265.	313.	847.	65.5
1.04	2.00	74	74.00	255.	305.	843.	65.5
1.04	3.00	75	75.00	246.	302.	839.	65.4
1.04	4.00	76	76.00	238.	298.	834.	65.4
1.04	5.00	77	77.00	229.	294.	829.	65.3
1.04	6.00	78	78.00	221.	289.	824.	65.3
1.04	7.00	79	79.00	213.	284.	818.	65.2
1.04	8.00	80	80.00	206.	279.	812.	65.1
1.04	9.00	81	81.00	198.	274.	806.	65.1
1.04	10.00	82	82.00	191.	270.	800.	65.0
1.04	11.00	83	83.00	185.	267.	793.	64.9
1.04	12.00	84	84.00	178.	265.	786.	64.8
1.04	13.00	85	85.00	172.	263.	779.	64.7
1.04	14.00	86	86.00	166.	260.	771.	64.7
1.04	15.00	87	87.00	160.	258.	763.	64.6
1.04	16.00	88	88.00	154.	255.	755.	64.5
1.04	17.00	89	89.00	149.	252.	746.	64.4
1.04	18.00	90	90.00	143.	250.	738.	64.3
1.04	19.00	91	91.00	138.	247.	729.	64.2
1.04	20.00	92	92.00	133.	243.	720.	64.1
1.04	21.00	93	93.00	129.	240.	710.	64.0
1.04	22.00	94	94.00	124.	236.	701.	63.9
1.04	23.00	95	95.00	120.	232.	692.	63.8
1.05	0.00	96	96.00	115.	228.	683.	63.7
1.05	1.00	97	97.00	111.	224.	673.	63.6
1.05	2.00	98	98.00	107.	220.	664.	63.5
1.05	3.00	99	99.00	104.	216.	655.	63.3
1.05	4.00	100	100.00	100.	212.	645.	63.2
1.05	5.00	101	101.00	96.	208.	636.	63.1
1.05	6.00	102	102.00	93.	203.	627.	63.0
1.05	7.00	103	103.00	90.	199.	618.	62.9
1.05	8.00	104	104.00	86.	193.	609.	62.8

1.05	10.00	106	106.00	80.	183.	592.	62.6
1.05	11.00	107	107.00	78.	178.	583.	62.5
1.05	12.00	108	108.00	75.	172.	575.	62.5
1.05	13.00	109	109.00	72.	164.	567.	62.4
1.05	14.00	110	110.00	69.	157.	560.	62.3
1.05	15.00	111	111.00	66.	150.	553.	62.2
1.05	16.00	112	112.00	63.	143.	546.	62.1
1.05	17.00	113	113.00	59.	136.	540.	62.0
1.05	18.00	114	114.00	55.	130.	533.	62.0
1.05	19.00	115	115.00	51.	125.	527.	61.9
1.05	20.00	116	116.00	48.	120.	521.	61.8
1.05	21.00	117	117.00	45.	114.	515.	61.8
1.05	22.00	118	118.00	42.	109.	510.	61.7
1.05	23.00	119	119.00	39.	105.	504.	61.6
1.06	0.00	120	120.00	35.	100.	499.	61.6
1.06	1.00	121	121.00	34.	95.	494.	61.5
1.06	2.00	122	122.00	32.	91.	489.	61.5
1.06	3.00	123	123.00	29.	87.	484.	61.4
1.06	4.00	124	124.00	28.	84.	479.	61.4
1.06	5.00	125	125.00	26.	80.	474.	61.3
1.06	6.00	126	126.00	24.	77.	470.	61.3
1.06	7.00	127	127.00	22.	73.	466.	61.2
1.06	8.00	128	128.00	21.	70.	462.	61.2
1.06	9.00	129	129.00	19.	67.	458.	61.1
1.06	10.00	130	130.00	18.	64.	454.	61.1
1.06	11.00	131	131.00	17.	61.	450.	61.0
1.06	12.00	132	132.00	16.	58.	447.	61.0
1.06	13.00	133	133.00	15.	56.	443.	61.0
1.06	14.00	134	134.00	14.	54.	440.	60.9
1.06	15.00	135	135.00	13.	52.	437.	60.9
1.06	16.00	136	136.00	12.	50.	433.	60.9
1.06	17.00	137	137.00	11.	48.	430.	60.8
1.06	18.00	138	138.00	10.	46.	427.	60.8
1.06	19.00	139	139.00	10.	44.	424.	60.8
1.06	20.00	140	140.00	9.	42.	422.	60.7
1.06	21.00	141	141.00	8.	41.	419.	60.7
1.06	22.00	142	142.00	8.	39.	416.	60.7
1.06	23.00	143	143.00	7.	37.	414.	60.6
1.07	0.00	144	144.00	7.	35.	411.	60.6
1.07	1.00	145	145.00	6.	34.	409.	60.6
1.07	2.00	146	146.00	6.	33.	407.	60.6
1.07	3.00	147	147.00	6.	31.	405.	60.5
1.07	4.00	148	148.00	5.	30.	403.	60.5
1.07	5.00	149	149.00	5.	29.	401.	60.5
1.07	6.00	150	150.00	5.	28.	399.	60.5
1.07	7.00	151	151.00	4.	27.	397.	60.4
1.07	8.00	152	152.00	4.	26.	395.	60.4
1.07	9.00	153	153.00	4.	26.	393.	60.4
1.07	10.00	154	154.00	3.	25.	391.	60.4
1.07	11.00	155	155.00	3.	24.	389.	60.4
1.07	12.00	156	156.00	3.	23.	388.	60.3
1.07	13.00	157	157.00	3.	22.	386.	60.3
1.07	14.00	158	158.00	3.	22.	384.	60.3
1.07	15.00	159	159.00	2.	21.	383.	60.3
1.07	16.00	160	160.00	2.	20.	381.	60.3
1.07	17.00	161	161.00	2.	19.	380.	60.2
1.07	18.00	162	162.00	2.	19.	379.	60.2
1.07	19.00	163	163.00	2.	18.	377.	60.2
1.07	20.00	164	164.00	2.	17.	376.	60.2
1.07	21.00	165	165.00	2.	17.	375.	60.2
1.07	22.00	166	166.00	1.	16.	373.	60.2
1.07	23.00	167	167.00	1.	16.	372.	60.2
1.08	0.00	168	168.00	1.	15.	371.	60.1
1.08	1.00	169	169.00	1.	15.	370.	60.1
1.08	2.00	170	170.00	1.	14.	369.	60.1

1.08	3.00	171	171.00	1.	14.	368.	60.1
1.08	4.00	172	172.00	1.	13.	367.	60.1
1.08	5.00	173	173.00	1.	13.	366.	60.1
1.08	6.00	174	174.00	1.	12.	365.	60.1
1.08	7.00	175	175.00	1.	12.	364.	60.1
1.08	8.00	176	176.00	1.	11.	363.	60.1
1.08	9.00	177	177.00	1.	11.	362.	60.0
1.08	10.00	178	178.00	1.	11.	361.	60.0
1.08	11.00	179	179.00	1.	10.	360.	60.0
1.08	12.00	180	180.00	1.	10.	360.	60.0
1.08	13.00	181	181.00	1.	9.	359.	60.0
1.08	14.00	182	182.00	0.	9.	358.	60.0
1.08	15.00	183	183.00	0.	9.	358.	60.0
1.08	16.00	184	184.00	0.	9.	357.	60.0
1.08	17.00	185	185.00	0.	8.	356.	60.0
1.08	18.00	186	186.00	0.	8.	355.	60.0
1.08	19.00	187	187.00	0.	8.	355.	60.0
1.08	20.00	188	188.00	0.	8.	355.	59.9
1.08	21.00	189	189.00	0.	8.	354.	59.9
1.08	22.00	190	190.00	0.	7.	354.	59.9
1.08	23.00	191	191.00	0.	7.	353.	59.9
1.09	0.00	192	192.00	0.	7.	353.	59.9
1.09	1.00	193	193.00	0.	7.	352.	59.9
1.09	2.00	194	194.00	0.	7.	352.	59.9
1.09	3.00	195	195.00	0.	6.	351.	59.9
1.09	4.00	196	196.00	0.	6.	351.	59.9
1.09	5.00	197	197.00	0.	6.	350.	59.9
1.09	6.00	198	198.00	0.	6.	350.	59.9
1.09	7.00	199	199.00	0.	6.	349.	59.9
1.09	8.00	200	200.00	0.	6.	349.	59.8
1.09	9.00	201	201.00	0.	5.	349.	59.8
1.09	10.00	202	202.00	0.	5.	348.	59.8
1.09	11.00	203	203.00	0.	5.	348.	59.8
1.09	12.00	204	204.00	0.	5.	347.	59.8
1.09	13.00	205	205.00	0.	5.	347.	59.8
1.09	14.00	206	206.00	0.	5.	347.	59.8
1.09	15.00	207	207.00	0.	5.	346.	59.8
1.09	16.00	208	208.00	0.	4.	346.	59.8
1.09	17.00	209	209.00	0.	4.	346.	59.8
1.09	18.00	210	210.00	0.	4.	345.	59.8
1.09	19.00	211	211.00	0.	4.	345.	59.8
1.09	20.00	212	212.00	0.	4.	345.	59.8
1.09	21.00	213	213.00	0.	4.	344.	59.8
1.09	22.00	214	214.00	0.	4.	344.	59.8
1.09	23.00	215	215.00	0.	4.	344.	59.8
1.10	0.00	216	216.00	0.	4.	344.	59.8
1.10	1.00	217	217.00	0.	3.	343.	59.8
1.10	2.00	218	218.00	0.	3.	343.	59.7
1.10	3.00	219	219.00	0.	3.	343.	59.7
1.10	4.00	220	220.00	0.	3.	342.	59.7
1.10	5.00	221	221.00	0.	3.	342.	59.7
1.10	6.00	222	222.00	0.	3.	342.	59.7
1.10	7.00	223	223.00	0.	3.	342.	59.7
1.10	8.00	224	224.00	0.	3.	342.	59.7
1.10	9.00	225	225.00	0.	3.	341.	59.7
1.10	10.00	226	226.00	0.	3.	341.	59.7
1.10	11.00	227	227.00	0.	3.	341.	59.7
1.10	12.00	228	228.00	0.	3.	341.	59.7
1.10	13.00	229	229.00	0.	2.	341.	59.7
1.10	14.00	230	230.00	0.	2.	340.	59.7
1.10	15.00	231	231.00	0.	2.	340.	59.7
1.10	16.00	232	232.00	0.	2.	340.	59.7
1.10	17.00	233	233.00	0.	2.	340.	59.7
1.10	18.00	234	234.00	0.	2.	340.	59.7
1.10	19.00	235	235.00	0.	2.	340.	59.7
1.10	20.00	236	236.00	0.	2.	339.	59.7
1.10	21.00	237	237.00	0.	2.	339.	59.7
1.10	22.00	238	238.00	0.	2.	339.	59.7
1.10	23.00	239	239.00	0.	2.	339.	59.7
1.11	0.00	240	240.00	0.	2.	339.	59.7
1.11	1.00	241	241.00	0.	2.	339.	59.7

1.11	3.00	243	243.00	0.	2.	338.	59.7
1.11	4.00	244	244.00	0.	2.	338.	59.7
1.11	5.00	245	245.00	0.	2.	338.	59.7
1.11	6.00	246	246.00	0.	2.	338.	59.7
1.11	7.00	247	247.00	0.	1.	338.	59.7
1.11	8.00	248	248.00	0.	1.	338.	59.7
1.11	9.00	249	249.00	0.	1.	338.	59.7
1.11	10.00	250	250.00	0.	1.	338.	59.7
1.11	11.00	251	251.00	0.	1.	337.	59.7
1.11	12.00	252	252.00	0.	1.	337.	59.7
1.11	13.00	253	253.00	0.	1.	337.	59.7
1.11	14.00	254	254.00	0.	1.	337.	59.7
1.11	15.00	255	255.00	0.	1.	337.	59.7
1.11	16.00	256	256.00	0.	1.	337.	59.7
1.11	17.00	257	257.00	0.	1.	337.	59.6
1.11	18.00	258	258.00	0.	1.	337.	59.6
1.11	19.00	259	259.00	0.	1.	337.	59.6
1.11	20.00	260	260.00	0.	1.	337.	59.6
1.11	21.00	261	261.00	0.	1.	337.	59.6
1.11	22.00	262	262.00	0.	1.	337.	59.6
1.11	23.00	263	263.00	0.	1.	336.	59.6
1.12	0.00	264	264.00	0.	1.	336.	59.6
1.12	1.00	265	265.00	0.	1.	336.	59.6
1.12	2.00	266	266.00	0.	1.	336.	59.6
1.12	3.00	267	267.00	0.	1.	336.	59.6
1.12	4.00	268	268.00	0.	1.	336.	59.6
1.12	5.00	269	269.00	0.	1.	336.	59.6
1.12	6.00	270	270.00	0.	1.	336.	59.6
1.12	7.00	271	271.00	0.	1.	336.	59.6
1.12	8.00	272	272.00	0.	1.	336.	59.6
1.12	9.00	273	273.00	0.	1.	336.	59.6
1.12	10.00	274	274.00	0.	1.	336.	59.6
1.12	11.00	275	275.00	0.	1.	336.	59.6
1.12	12.00	276	276.00	0.	1.	336.	59.6
1.12	13.00	277	277.00	0.	1.	336.	59.6
1.12	14.00	278	278.00	0.	1.	336.	59.6
1.12	15.00	279	279.00	0.	1.	336.	59.6
1.12	16.00	280	280.00	0.	1.	335.	59.6
1.12	17.00	281	281.00	0.	1.	335.	59.6
1.12	18.00	282	282.00	0.	1.	335.	59.6
1.12	19.00	283	283.00	0.	1.	335.	59.6
1.12	20.00	284	284.00	0.	0.	335.	59.6
1.12	21.00	285	285.00	0.	0.	335.	59.6
1.12	22.00	286	286.00	0.	0.	335.	59.6
1.12	23.00	287	287.00	0.	0.	335.	59.6
1.13	0.00	288	288.00	0.	0.	335.	59.6
1.13	1.00	289	289.00	0.	0.	335.	59.6
1.13	2.00	290	290.00	0.	0.	335.	59.6
1.13	3.00	291	291.00	0.	0.	335.	59.6
1.13	4.00	292	292.00	0.	0.	335.	59.6
1.13	5.00	293	293.00	0.	0.	335.	59.6
1.13	6.00	294	294.00	0.	0.	335.	59.6
1.13	7.00	295	295.00	0.	0.	335.	59.6
1.13	8.00	296	296.00	0.	0.	335.	59.6
1.13	9.00	297	297.00	0.	0.	335.	59.6
1.13	10.00	298	298.00	0.	0.	335.	59.6
1.13	11.00	299	299.00	0.	0.	335.	59.6
1.13	12.00	300	300.00	0.	0.	335.	59.6

PEAK OUTFLOW IS 1367. AT TIME 27.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1367.	1303.	1009.	595.	49693.
CMS	39.	37.	29.	17.	1407.
INCHES		1.66	5.14	8.95	10.55
MM		42.19	130.61	227.25	268.07
AC-FT		646.	2001.	3481.	4107.
THOUS CU M		797.	2468.	4294.	5066.

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   **********          **********          **********          **********          **********

                                    COMBINE HYDROGRAPHS

                           COMBINE HYDROGRAPHS IN TAUNTON LAKE

                   ISTAQ    ICOMP    IECON    ITAPE    JPLT    JPRT    INAME   ISTAGE   IAUTO
                    TAUN        2        0        0       0       0        1        0       0

                   SUM OF 2 HYDROGRAPHS AT     TAUN  PLAN 1  RTIO 1

                         PEAK    6-HOUR   24-HOUR   72-HOUR    TOTAL VOLUME
              CFS       2799.     2611.     2100.     1107.          89243.
              CMS         79.       74.       59.       31.           2527.
           INCHES                  1.87      6.01      9.51           10.64
               MM                 47.46    152.70    241.53          270.34
            AC-FT                 1295.     4166.     6590.           7375.
        THOUS CU M                1597.     5139.     8128.           9097.

   **********          **********          **********          **********          **********

                                    HYDROGRAPH ROUTING

                         ROUTE HYDROGRAPH THROUGH BREAKNECK DAM

                   ISTAQ    ICOMP    IECON    ITAPE    JPLT    JPRT    INAME   ISTAGE   IAUTO
                    BKNK        1        0        0       0       0        1        0       0
                                            ROUTING DATA
           QLOSS   CLOSS      AVG     IRES    ISAME    IOPT    IPMP                     LSTR
             0.0   0.000     0.00        1        1       0       0                        0

                   NSTPS    NSTDL      LAG    AMSKK       X     TSK     STORA   ISPRAT
                       1        0        0    0.000   0.000   0.000     -51.       -1

  STAGE       51.00     52.00     53.00     54.00     55.00     56.00     57.00     58.00     59.00     60.00
              62.00     64.00

  FLOW         2.00    170.00    530.00    927.00   1250.00   1310.00   1398.00   1500.00   1580.00   1635.00
            1775.00   1880.00

 SURFACE AREA=      0.      39.      78.

     CAPACITY=      0.     122.     639.

    ELEVATION=     42.      51.      60.

                 CREL   SPWID    COQW    EXPW   ELEVL    COOL   CAREA    EXPL
                 51.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

                                          DAM DATA
                                 TOPEL    COQD    EXPD   DAMWID
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STATION BRNK, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	3.	2.	122.	51.0
1.01	2.00	2	2.00	3.	2.	122.	51.0
1.01	3.00	3	3.00	3.	2.	122.	51.0
1.01	4.00	4	4.00	3.	2.	122.	51.0
1.01	5.00	5	5.00	2.	2.	122.	51.0
1.01	6.00	6	6.00	2.	2.	122.	51.0
1.01	7.00	7	7.00	2.	2.	122.	51.0
1.01	8.00	8	8.00	2.	2.	122.	51.0
1.01	9.00	9	9.00	3.	2.	122.	51.0
1.01	10.00	10	10.00	7.	3.	122.	51.0
1.01	11.00	11	11.00	17.	6.	123.	51.0
1.01	12.00	12	12.00	33.	12.	124.	51.1
1.01	13.00	13	13.00	70.	23.	127.	51.1
1.01	14.00	14	14.00	154.	51.	134.	51.3
1.01	15.00	15	15.00	343.	110.	148.	51.6
1.01	16.00	16	16.00	660.	262.	174.	52.3
1.01	17.00	17	17.00	1118.	575.	213.	53.1
1.01	18.00	18	18.00	1624.	968.	263.	54.1
1.01	19.00	19	19.00	2050.	1265.	322.	55.2
1.01	20.00	20	20.00	2284.	1579.	384.	56.3
1.01	21.00	21	21.00	2339.	2160.	420.	56.9
1.01	22.00	22	22.00	2274.	2287.	427.	57.0
1.01	23.00	23	23.00	2171.	2231.	424.	57.0
1.02	0.00	24	24.00	2149.	2170.	421.	56.9
1.02	1.00	25	25.00	2457.	2285.	427.	57.0
1.02	2.00	26	26.00	2778.	2593.	442.	57.2
1.02	3.00	27	27.00	2799.	2772.	451.	57.4
1.02	4.00	28	28.00	2698.	2750.	450.	57.4
1.02	5.00	29	29.00	2568.	2642.	445.	57.3
1.02	6.00	30	30.00	2438.	2516.	439.	57.2
1.02	7.00	31	31.00	2313.	2390.	433.	57.1
1.02	8.00	32	32.00	2195.	2270.	426.	57.0
1.02	9.00	33	33.00	2083.	2157.	420.	56.9
1.02	10.00	34	34.00	1977.	2050.	414.	56.8
1.02	11.00	35	35.00	1878.	1948.	408.	56.7
1.02	12.00	36	36.00	1784.	1853.	402.	56.6
1.02	13.00	37	37.00	1695.	1754.	397.	56.5
1.02	14.00	38	38.00	1611.	1679.	391.	56.4
1.02	15.00	39	39.00	1533.	1600.	385.	56.3
1.02	16.00	40	40.00	1458.	1527.	380.	56.2
1.02	17.00	41	41.00	1388.	1458.	374.	56.1
1.02	18.00	42	42.00	1321.	1395.	368.	56.0
1.02	19.00	43	43.00	1258.	1339.	362.	55.9
1.02	20.00	44	44.00	1199.	1299.	354.	55.8
1.02	21.00	45	45.00	1142.	1288.	344.	55.6
1.02	22.00	46	46.00	1089.	1274.	330.	55.4
1.02	23.00	47	47.00	1039.	1256.	314.	55.1
1.03	0.00	48	48.00	991.	1191.	297.	54.8
1.03	1.00	49	49.00	945.	1096.	283.	54.5
1.03	2.00	50	50.00	904.	1026.	272.	54.3
1.03	3.00	51	51.00	863.	967.	262.	54.1
1.03	4.00	52	52.00	825.	914.	254.	54.0
1.03	5.00	53	53.00	789.	861.	248.	53.8
1.03	6.00	54	54.00	755.	817.	242.	53.7
1.03	7.00	55	55.00	722.	778.	237.	53.6
1.03	8.00	56	56.00	692.	742.	233.	53.5
1.03	9.00	57	57.00	663.	709.	229.	53.5
1.03	10.00	58	58.00	636.	679.	225.	53.4
1.03	11.00	59	59.00	610.	650.	222.	53.3
1.03	12.00	60	60.00	587.	624.	219.	53.2
1.03	13.00	61	61.00	565.	599.	216.	53.2
1.03	14.00	62	62.00	545.	576.	213.	53.1
1.03	15.00	63	63.00	530.	556.	211.	53.1
1.03	16.00	64	64.00	512.	538.	209.	53.0
1.03	17.00	65	65.00	494.	521.	206.	53.0
1.03	18.00	66	66.00	477.	504.	204.	52.9
1.03	19.00	67	67.00	459.	486.	202.	52.9
1.03	20.00	68	68.00	442.	469.	200.	52.8
1.03	21.00	69	69.00	426.	452.	198.	52.8
1.03	22.00	70	70.00	410.	435.	195.	52.7

1.04	0.00	72	72.00	379.	403.	191.	52.6
1.04	1.00	73	73.00	364.	387.	189.	52.6
1.04	2.00	74	74.00	353.	373.	188.	52.6
1.04	3.00	75	75.00	346.	362.	186.	52.5
1.04	4.00	76	76.00	339.	352.	185.	52.5
1.04	5.00	77	77.00	332.	344.	184.	52.5
1.04	6.00	78	78.00	325.	336.	183.	52.5
1.04	7.00	79	79.00	318.	329.	182.	52.4
1.04	8.00	80	80.00	311.	322.	181.	52.4
1.04	9.00	81	81.00	304.	314.	180.	52.4
1.04	10.00	82	82.00	297.	307.	180.	52.4
1.04	11.00	83	83.00	293.	301.	179.	52.4
1.04	12.00	84	84.00	289.	296.	178.	52.4
1.04	13.00	85	85.00	285.	292.	178.	52.3
1.04	14.00	86	86.00	281.	287.	177.	52.3
1.04	15.00	87	87.00	277.	283.	177.	52.3
1.04	16.00	88	88.00	273.	279.	176.	52.3
1.04	17.00	89	89.00	269.	275.	176.	52.3
1.04	18.00	90	90.00	265.	271.	175.	52.3
1.04	19.00	91	91.00	261.	267.	175.	52.3
1.04	20.00	92	92.00	257.	263.	174.	52.3
1.04	21.00	93	93.00	253.	259.	174.	52.2
1.04	22.00	94	94.00	248.	255.	173.	52.2
1.04	23.00	95	95.00	243.	250.	173.	52.2
1.05	0.00	96	96.00	239.	246.	172.	52.2
1.05	1.00	97	97.00	234.	241.	171.	52.2
1.05	2.00	98	98.00	229.	236.	171.	52.2
1.05	3.00	99	99.00	224.	231.	170.	52.2
1.05	4.00	100	100.00	220.	227.	170.	52.2
1.05	5.00	101	101.00	215.	222.	169.	52.1
1.05	6.00	102	102.00	210.	217.	169.	52.1
1.05	7.00	103	103.00	205.	212.	168.	52.1
1.05	8.00	104	104.00	199.	207.	167.	52.1
1.05	9.00	105	105.00	194.	202.	167.	52.1
1.05	10.00	106	106.00	188.	196.	166.	52.1
1.05	11.00	107	107.00	183.	191.	165.	52.1
1.05	12.00	108	108.00	176.	185.	165.	52.0
1.05	13.00	109	109.00	168.	179.	164.	52.0
1.05	14.00	110	110.00	161.	171.	163.	52.0
1.05	15.00	111	111.00	153.	167.	162.	52.0
1.05	16.00	112	112.00	145.	162.	161.	52.0
1.05	17.00	113	113.00	140.	157.	160.	51.9
1.05	18.00	114	114.00	133.	151.	159.	51.9
1.05	19.00	115	115.00	128.	146.	157.	51.9
1.05	20.00	116	116.00	122.	140.	155.	51.8
1.05	21.00	117	117.00	117.	134.	154.	51.8
1.05	22.00	118	118.00	112.	129.	153.	51.8
1.05	23.00	119	119.00	107.	123.	151.	51.7
1.06	0.00	120	120.00	102.	118.	150.	51.7
1.06	1.00	121	121.00	97.	113.	149.	51.7
1.06	2.00	122	122.00	93.	108.	147.	51.6
1.06	3.00	123	123.00	89.	103.	146.	51.6
1.06	4.00	124	124.00	85.	98.	145.	51.6
1.06	5.00	125	125.00	81.	94.	144.	51.5
1.06	6.00	126	126.00	78.	90.	143.	51.5
1.06	7.00	127	127.00	74.	86.	142.	51.5
1.06	8.00	128	128.00	71.	82.	141.	51.5
1.06	9.00	129	129.00	68.	78.	140.	51.5
1.06	10.00	130	130.00	65.	75.	139.	51.4
1.06	11.00	131	131.00	62.	72.	139.	51.4
1.06	12.00	132	132.00	59.	68.	138.	51.4
1.06	13.00	133	133.00	57.	65.	137.	51.4
1.06	14.00	134	134.00	54.	62.	136.	51.4

1.06	16.00	136	136.00	50.	57.	135.	51.3
1.06	17.00	137	137.00	48.	55.	135.	51.3
1.06	18.00	138	138.00	46.	53.	134.	51.3
1.06	19.00	139	139.00	45.	51.	134.	51.3
1.06	20.00	140	140.00	43.	49.	133.	51.3
1.06	21.00	141	141.00	41.	47.	133.	51.3
1.06	22.00	142	142.00	39.	45.	132.	51.3
1.06	23.00	143	143.00	38.	43.	132.	51.2
1.07	0.00	144	144.00	36.	41.	131.	51.2
1.07	1.00	145	145.00	35.	39.	131.	51.2
1.07	2.00	146	146.00	33.	38.	131.	51.2
1.07	3.00	147	147.00	32.	36.	130.	51.2
1.07	4.00	148	148.00	30.	35.	130.	51.2
1.07	5.00	149	149.00	29.	33.	130.	51.2
1.07	6.00	150	150.00	28.	32.	129.	51.2
1.07	7.00	151	151.00	28.	31.	129.	51.2
1.07	8.00	152	152.00	27.	30.	129.	51.2
1.07	9.00	153	153.00	26.	29.	128.	51.2
1.07	10.00	154	154.00	25.	28.	128.	51.2
1.07	11.00	155	155.00	24.	27.	128.	51.1
1.07	12.00	156	156.00	23.	26.	128.	51.1
1.07	13.00	157	157.00	22.	25.	128.	51.1
1.07	14.00	158	158.00	22.	24.	127.	51.1
1.07	15.00	159	159.00	21.	23.	127.	51.1
1.07	16.00	160	160.00	20.	22.	127.	51.1
1.07	17.00	161	161.00	20.	22.	127.	51.1
1.07	18.00	162	162.00	19.	21.	127.	51.1
1.07	19.00	163	163.00	18.	20.	126.	51.1
1.07	20.00	164	164.00	18.	20.	126.	51.1
1.07	21.00	165	165.00	17.	19.	126.	51.1
1.07	22.00	166	166.00	16.	18.	126.	51.1
1.07	23.00	167	167.00	16.	18.	126.	51.1
1.08	0.00	168	168.00	15.	17.	126.	51.1
1.08	1.00	169	169.00	15.	16.	125.	51.1
1.08	2.00	170	170.00	14.	16.	125.	51.1
1.08	3.00	171	171.00	14.	15.	125.	51.1
1.08	4.00	172	172.00	13.	15.	125.	51.1
1.08	5.00	173	173.00	13.	14.	125.	51.1
1.08	6.00	174	174.00	12.	14.	125.	51.1
1.08	7.00	175	175.00	12.	13.	125.	51.1
1.08	8.00	176	176.00	11.	13.	125.	51.1
1.08	9.00	177	177.00	11.	12.	125.	51.1
1.08	10.00	178	178.00	11.	12.	124.	51.1
1.08	11.00	179	179.00	10.	11.	124.	51.1
1.08	12.00	180	180.00	10.	11.	124.	51.1
1.08	13.00	181	181.00	9.	11.	124.	51.1
1.08	14.00	182	182.00	9.	10.	124.	51.0
1.08	15.00	183	183.00	9.	10.	124.	51.0
1.08	16.00	184	184.00	9.	10.	124.	51.0
1.08	17.00	185	185.00	8.	9.	124.	51.0
1.08	18.00	186	186.00	8.	9.	124.	51.0
1.08	19.00	187	187.00	8.	9.	124.	51.0
1.08	20.00	188	188.00	8.	8.	124.	51.0
1.08	21.00	189	189.00	8.	8.	124.	51.0
1.08	22.00	190	190.00	7.	8.	124.	51.0
1.08	23.00	191	191.00	7.	8.	124.	51.0
1.09	0.00	192	192.00	7.	8.	123.	51.0
1.09	1.00	193	193.00	7.	7.	123.	51.0
1.09	2.00	194	194.00	7.	7.	123.	51.0
1.09	3.00	195	195.00	6.	7.	123.	51.0
1.09	4.00	196	196.00	6.	7.	123.	51.0
1.09	5.00	197	197.00	6.	7.	123.	51.0
1.09	6.00	198	198.00	6.	6.	123.	51.0
1.09	7.00	199	199.00	6.	6.	123.	51.0

1.09	8.00	200	200.00	5.	6.	123.	51.0
1.09	9.00	201	201.00	5.	6.	123.	51.0
1.09	10.00	202	202.00	5.	6.	123.	51.0
1.09	11.00	203	203.00	5.	5.	123.	51.0
1.09	12.00	204	204.00	5.	5.	123.	51.0
1.09	13.00	205	205.00	5.	5.	123.	51.0
1.09	14.00	206	206.00	5.	5.	123.	51.0
1.09	15.00	207	207.00	5.	5.	123.	51.0
1.09	16.00	208	208.00	4.	5.	123.	51.0
1.09	17.00	209	209.00	4.	5.	123.	51.0
1.09	18.00	210	210.00	4.	5.	123.	51.0
1.09	19.00	211	211.00	4.	4.	123.	51.0
1.09	20.00	212	212.00	4.	4.	123.	51.0
1.09	21.00	213	213.00	4.	4.	123.	51.0
1.09	22.00	214	214.00	4.	4.	123.	51.0
1.09	23.00	215	215.00	4.	4.	123.	51.0
1.10	0.00	216	216.00	4.	4.	123.	51.0
1.10	1.00	217	217.00	3.	4.	123.	51.0
1.10	2.00	218	218.00	3.	4.	123.	51.0
1.10	3.00	219	219.00	3.	4.	123.	51.0
1.10	4.00	220	220.00	3.	3.	123.	51.0
1.10	5.00	221	221.00	3.	3.	123.	51.0
1.10	6.00	222	222.00	3.	3.	122.	51.0
1.10	7.00	223	223.00	3.	3.	122.	51.0
1.10	8.00	224	224.00	3.	3.	122.	51.0
1.10	9.00	225	225.00	3.	3.	122.	51.0
1.10	10.00	226	226.00	3.	3.	122.	51.0
1.10	11.00	227	227.00	3.	3.	122.	51.0
1.10	12.00	228	228.00	3.	3.	122.	51.0
1.10	13.00	229	229.00	2.	3.	122.	51.0
1.10	14.00	230	230.00	2.	3.	122.	51.0
1.10	15.00	231	231.00	2.	3.	122.	51.0
1.10	16.00	232	232.00	2.	2.	122.	51.0
1.10	17.00	233	233.00	2.	2.	122.	51.0
1.10	18.00	234	234.00	2.	2.	122.	51.0
1.10	19.00	235	235.00	2.	2.	122.	51.0
1.10	20.00	236	236.00	2.	2.	122.	51.0
1.10	21.00	237	237.00	2.	2.	122.	51.0
1.10	22.00	238	238.00	2.	2.	122.	51.0
1.10	23.00	239	239.00	2.	2.	122.	51.0
1.11	0.00	240	240.00	2.	2.	122.	51.0
1.11	1.00	241	241.00	2.	2.	122.	51.0
1.11	2.00	242	242.00	2.	2.	122.	51.0
1.11	3.00	243	243.00	2.	2.	122.	51.0
1.11	4.00	244	244.00	2.	2.	122.	51.0
1.11	5.00	245	245.00	2.	2.	122.	51.0
1.11	6.00	246	246.00	2.	2.	122.	51.0
1.11	7.00	247	247.00	1.	2.	122.	51.0
1.11	8.00	248	248.00	1.	2.	122.	51.0
1.11	9.00	249	249.00	1.	2.	122.	51.0
1.11	10.00	250	250.00	1.	2.	122.	51.0
1.11	11.00	251	251.00	1.	2.	122.	51.0
1.11	12.00	252	252.00	1.	2.	122.	51.0
1.11	13.00	253	253.00	1.	2.	122.	51.0
1.11	14.00	254	254.00	1.	2.	122.	51.0
1.11	15.00	255	255.00	1.	2.	122.	51.0
1.11	16.00	256	256.00	1.	2.	121.	51.0

1.11	17.00	257	257.00	1.	2.	121.	51.0
1.11	18.00	258	258.00	1.	2.	121.	51.0
1.11	19.00	259	259.00	1.	2.	121.	51.0
1.11	20.00	260	260.00	1.	2.	121.	51.0
1.11	21.00	261	261.00	1.	2.	121.	51.0
1.11	22.00	262	262.00	1.	2.	121.	51.0
1.11	23.00	263	263.00	1.	2.	121.	51.0
1.12	0.00	264	264.00	1.	2.	121.	51.0
1.12	1.00	265	265.00	1.	2.	121.	51.0
1.12	2.00	266	266.00	1.	2.	121.	51.0
1.12	3.00	267	267.00	1.	2.	121.	51.0
1.12	4.00	268	268.00	1.	2.	120.	51.0
1.12	5.00	269	269.00	1.	2.	120.	51.0
1.12	6.00	270	270.00	1.	2.	120.	51.0
1.12	7.00	271	271.00	1.	2.	120.	50.9
1.12	8.00	272	272.00	1.	2.	120.	50.9
1.12	9.00	273	273.00	1.	2.	120.	50.9
1.12	10.00	274	274.00	1.	2.	120.	50.9
1.12	11.00	275	275.00	1.	2.	120.	50.9
1.12	12.00	276	276.00	1.	2.	120.	50.9
1.12	13.00	277	277.00	1.	2.	120.	50.9
1.12	14.00	278	278.00	1.	2.	119.	50.9
1.12	15.00	279	279.00	1.	2.	119.	50.9
1.12	16.00	280	280.00	1.	2.	119.	50.9
1.12	17.00	281	281.00	1.	2.	119.	50.9
1.12	18.00	282	282.00	1.	2.	119.	50.9
1.12	19.00	283	283.00	1.	2.	119.	50.9
1.12	20.00	284	284.00	0.	2.	119.	50.9
1.12	21.00	285	285.00	0.	2.	119.	50.9
1.12	22.00	286	286.00	0.	2.	118.	50.9
1.12	23.00	287	287.00	0.	2.	118.	50.9
1.13	0.00	288	288.00	0.	2.	118.	50.9
1.13	1.00	289	289.00	0.	2.	118.	50.9
1.13	2.00	290	290.00	0.	2.	118.	50.9
1.13	3.00	291	291.00	0.	2.	118.	50.9
1.13	4.00	292	292.00	0.	2.	118.	50.9
1.13	5.00	293	293.00	0.	2.	118.	50.9
1.13	6.00	294	294.00	0.	2.	117.	50.9
1.13	7.00	295	295.00	0.	2.	117.	50.9
1.13	8.00	296	296.00	0.	2.	117.	50.9
1.13	9.00	297	297.00	0.	2.	117.	50.9
1.13	10.00	298	298.00	0.	2.	117.	50.9
1.13	11.00	299	299.00	0.	2.	117.	50.9
1.13	12.00	300	300.00	0.	2.	117.	50.9

PEAK OUTFLOW IS 2772. AT TIME 27.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2772.	2600.	2037.	1104.	89323.
CMS	78.	74.	58.	31.	2529.
INCHES		1.86	5.89	9.48	10.65
MM		47.25	149.54	240.78	270.58
AC-FT		1289.	4080.	6569.	7382.
THOUS CU M		1590.	5032.	8103.	9106.

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HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH LAKE PINE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LKPN	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-41.	-1

STAGE	41.00	42.00	43.00	44.00	45.00	46.00	46.90	48.00	54.00
FLOW	0.00	93.00	305.00	644.00	1022.00	1448.00	1544.00	1697.00	2094.00

SURFACE AREA=	0.	17.	46.
CAPACITY=	0.	45.	318.
ELEVATION=	33.	41.	50.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
46.9	2.6	1.5	140.

STATION LKPN, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	2.	1.	45.	41.0
1.01	2.00	2	2.00	2.	1.	45.	41.0
1.01	3.00	3	3.00	2.	2.	45.	41.0
1.01	4.00	4	4.00	2.	2.	45.	41.0
1.01	5.00	5	5.00	2.	2.	45.	41.0
1.01	6.00	6	6.00	2.	2.	45.	41.0
1.01	7.00	7	7.00	2.	2.	45.	41.0
1.01	8.00	8	8.00	2.	2.	45.	41.0
1.01	9.00	9	9.00	2.	2.	45.	41.0
1.01	10.00	10	10.00	3.	3.	45.	41.0
1.01	11.00	11	11.00	6.	3.	45.	41.0
1.01	12.00	12	12.00	12.	5.	46.	41.1
1.01	13.00	13	13.00	23.	10.	47.	41.1
1.01	14.00	14	14.00	51.	20.	48.	41.2
1.01	15.00	15	15.00	110.	41.	53.	41.4
1.01	16.00	16	16.00	252.	91.	63.	42.0
1.01	17.00	17	17.00	575.	284.	82.	42.9
1.01	18.00	18	18.00	968.	640.	107.	44.0
1.01	19.00	19	19.00	1265.	993.	132.	44.9
1.01	20.00	20	20.00	1578.	1314.	154.	45.7
1.01	21.00	21	21.00	2160.	1536.	191.	46.8
1.01	22.00	22	22.00	2287.	2018.	228.	47.9
1.01	23.00	23	23.00	2231.	2222.	237.	48.2
1.02	0.00	24	24.00	2170.	2204.	238.	48.1
1.02	1.00	25	25.00	2285.	2223.	239.	48.2
1.02	2.00	26	26.00	2583.	2404.	249.	48.4
1.02	3.00	27	27.00	2772.	2646.	262.	48.7
1.02	4.00	28	28.00	2750.	2750.	267.	48.8
1.02	5.00	29	29.00	2642.	2701.	265.	48.8
1.02	6.00	30	30.00	2516.	2591.	259.	48.6

1.02	8.00	32	32.00	2270.	2348.	246.	48.3
1.02	9.00	33	33.00	2157.	2233.	240.	48.2
1.02	10.00	34	34.00	2050.	2125.	234.	48.0
1.02	11.00	35	35.00	1948.	2016.	228.	47.8
1.02	12.00	36	36.00	1853.	1919.	222.	47.7
1.02	13.00	37	37.00	1754.	1823.	217.	47.6
1.02	14.00	38	38.00	1679.	1745.	211.	47.4
1.02	15.00	39	39.00	1600.	1669.	206.	47.2
1.02	16.00	40	40.00	1527.	1599.	200.	47.1
1.02	17.00	41	41.00	1458.	1544.	193.	46.9
1.02	18.00	42	42.00	1395.	1517.	185.	46.6
1.02	19.00	43	43.00	1339.	1491.	174.	46.3
1.02	20.00	44	44.00	1299.	1430.	163.	46.0
1.02	21.00	45	45.00	1288.	1331.	155.	45.7
1.02	22.00	46	46.00	1274.	1294.	153.	45.6
1.02	23.00	47	47.00	1256.	1272.	151.	45.6
1.03	0.00	48	48.00	1181.	1232.	148.	45.5
1.03	1.00	49	49.00	1096.	1162.	144.	45.3
1.03	2.00	50	50.00	1026.	1086.	138.	45.1
1.03	3.00	51	51.00	[illegible]	[illegible]	[illegible]	[illegible]
1.03	4.00	52	52.00	914.	963.	130.	44.8
1.03	5.00	53	53.00	861.	909.	126.	44.7
1.03	6.00	54	54.00	817.	858.	122.	44.6
1.03	7.00	55	55.00	778.	813.	119.	44.4
1.03	8.00	56	56.00	742.	773.	116.	44.3
1.03	9.00	57	57.00	709.	738.	114.	44.2
1.03	10.00	58	58.00	679.	705.	112.	44.2
1.03	11.00	59	59.00	650.	674.	110.	44.1
1.03	12.00	60	60.00	624.	646.	108.	44.0
1.03	13.00	61	61.00	599.	621.	106.	43.9
1.03	14.00	62	62.00	576.	597.	104.	43.9
1.03	15.00	63	63.00	556.	575.	102.	43.8
1.03	16.00	64	64.00	538.	555.	101.	43.7
1.03	17.00	65	65.00	521.	536.	100.	43.7
1.03	18.00	66	66.00	504.	519.	98.	43.6
1.03	19.00	67	67.00	485.	501.	97.	43.6
1.03	20.00	68	68.00	469.	484.	96.	43.5
1.03	21.00	69	69.00	452.	466.	95.	43.5
1.03	22.00	70	70.00	435.	449.	94.	43.4
1.03	23.00	71	71.00	419.	432.	92.	43.4
1.04	0.00	72	72.00	403.	416.	91.	43.3
1.04	1.00	73	73.00	387.	400.	90.	43.3
1.04	2.00	74	74.00	373.	385.	89.	43.2
1.04	3.00	75	75.00	362.	372.	88.	43.2
1.04	4.00	76	76.00	352.	360.	88.	43.2
1.04	5.00	77	77.00	344.	351.	87.	43.1
1.04	6.00	78	78.00	336.	343.	86.	43.1
1.04	7.00	79	79.00	329.	335.	86.	43.1
1.04	8.00	80	80.00	322.	328.	85.	43.1
1.04	9.00	81	81.00	314.	320.	85.	43.0
1.04	10.00	82	82.00	307.	313.	84.	43.0
1.04	11.00	83	83.00	301.	306.	84.	43.0
1.04	12.00	84	84.00	296.	302.	84.	43.0
1.04	13.00	85	85.00	292.	297.	83.	43.0
1.04	14.00	86	86.00	287.	293.	83.	42.9
1.04	15.00	87	87.00	283.	289.	82.	42.9
1.04	16.00	88	88.00	279.	285.	82.	42.9
1.04	17.00	89	89.00	275.	281.	81.	42.9
1.04	18.00	90	90.00	271.	277.	81.	42.9
1.04	19.00	91	91.00	267.	272.	80.	42.8
1.04	20.00	92	92.00	263.	268.	80.	42.8
1.04	21.00	93	93.00	259.	264.	80.	42.8
1.04	22.00	94	94.00	255.	260.	79.	42.8
1.04	23.00	95	95.00	250.	256.	79.	42.8
1.05	0.00	96	96.00	246.	251.	78.	42.7
1.05	1.00	97	97.00	241.	247.	78.	42.7
1.05	2.00	98	98.00	236.	242.	77.	42.7
1.05	3.00	99	99.00	231.	237.	77.	42.7
1.05	4.00	100	100.00	227.	233.	76.	42.7
1.05	5.00	101	101.00	222.	228.	76.	42.6
1.05	6.00	102	102.00	217.	223.	75.	42.6

1.05	7.00	103	103.00	212.	218.	75.	42.6
1.05	8.00	104	104.00	207.	213.	75.	42.6
1.05	9.00	105	105.00	202.	208.	74.	42.5
1.05	10.00	106	106.00	196.	203.	73.	42.5
1.05	11.00	107	107.00	191.	197.	73.	42.5
1.05	12.00	108	108.00	185.	192.	72.	42.5
1.05	13.00	109	109.00	178.	186.	72.	42.4
1.05	14.00	110	110.00	171.	179.	71.	42.4
1.05	15.00	111	111.00	167.	173.	71.	42.4
1.05	16.00	112	112.00	162.	168.	70.	42.4
1.05	17.00	113	113.00	157.	163.	70.	42.3
1.05	18.00	114	114.00	151.	158.	69.	42.3
1.05	19.00	115	115.00	146.	152.	69.	42.3
1.05	20.00	116	116.00	140.	146.	68.	42.3
1.05	21.00	117	117.00	134.	141.	67.	42.2
1.05	22.00	118	118.00	129.	135.	67.	42.2
1.05	23.00	119	119.00	123.	130.	66.	42.2
1.06	0.00	120	120.00	118.	124.	66.	42.1
1.06	1.00	121	121.00	113.	119.	65.	42.1
1.06	2.00	122	122.00	108.	114.	65.	42.1
1.06	3.00	123	123.00	103.	109.	64.	42.1
1.06	4.00	124	124.00	98.	104.	64.	42.1
1.06	5.00	125	125.00	94.	99.	64.	42.0
1.06	6.00	126	126.00	90.	95.	63.	42.0
1.06	7.00	127	127.00	86.	92.	63.	42.0
1.06	8.00	128	128.00	82.	89.	62.	42.0
1.06	9.00	129	129.00	78.	86.	62.	41.9
1.06	10.00	130	130.00	75.	83.	61.	41.9
1.06	11.00	131	131.00	72.	80.	60.	41.9
1.06	12.00	132	132.00	68.	77.	60.	41.8
1.06	13.00	133	133.00	65.	73.	59.	41.8
1.06	14.00	134	134.00	62.	70.	58.	41.8
1.06	15.00	135	135.00	60.	67.	58.	41.7
1.06	16.00	136	136.00	57.	64.	57.	41.7
1.06	17.00	137	137.00	55.	62.	57.	41.7
1.06	18.00	138	138.00	53.	59.	56.	41.6
1.06	19.00	139	139.00	51.	57.	56.	41.6
1.06	20.00	140	140.00	49.	54.	55.	41.6
1.06	21.00	141	141.00	47.	52.	55.	41.6
1.06	22.00	142	142.00	45.	50.	54.	41.5
1.06	23.00	143	143.00	43.	48.	54.	41.5
1.07	0.00	144	144.00	41.	46.	53.	41.5
1.07	1.00	145	145.00	39.	44.	53.	41.5
1.07	2.00	146	146.00	38.	42.	53.	41.5
1.07	3.00	147	147.00	36.	40.	52.	41.4
1.07	4.00	148	148.00	35.	39.	52.	41.4
1.07	5.00	149	149.00	33.	37.	52.	41.4
1.07	6.00	150	150.00	32.	36.	51.	41.4
1.07	7.00	151	151.00	31.	34.	51.	41.4
1.07	8.00	152	152.00	30.	33.	51.	41.4
1.07	9.00	153	153.00	29.	32.	51.	41.3
1.07	10.00	154	154.00	28.	30.	50.	41.3
1.07	11.00	155	155.00	27.	29.	50.	41.3
1.07	12.00	156	156.00	26.	28.	50.	41.3
1.07	13.00	157	157.00	25.	27.	50.	41.3
1.07	14.00	158	158.00	24.	26.	50.	41.3
1.07	15.00	159	159.00	23.	25.	49.	41.3
1.07	16.00	160	160.00	22.	24.	49.	41.3
1.07	17.00	161	161.00	22.	24.	49.	41.3
1.07	18.00	162	162.00	21.	23.	49.	41.2
1.07	19.00	163	163.00	20.	22.	49.	41.2
1.07	20.00	164	164.00	20.	21.	49.	41.2
1.07	21.00	165	165.00	19.	21.	49.	41.2
1.07	22.00	166	166.00	18.	20.	48.	41.2
1.07	23.00	167	167.00	18.	19.	48.	41.2
1.08	0.00	168	168.00	17.	18.	48.	41.2
1.08	1.00	169	169.00	16.	18.	48.	41.2
1.08	2.00	170	170.00	16.	17.	48.	41.2
1.08	3.00	171	171.00	15.	17.	48.	41.2
1.08	4.00	172	172.00	15.	16.	48.	41.2
1.08	5.00	173	173.00	14.	15.	48.	41.2
1.08	6.00	174	174.00	14.	15.	48.	41.2

1.08	7.00	175	175.00	13.	14.	47.	41.2
1.08	8.00	176	176.00	13.	14.	47.	41.1
1.08	9.00	177	177.00	12.	13.	47.	41.1
1.08	10.00	178	178.00	12.	13.	47.	41.1
1.08	11.00	179	179.00	11.	12.	47.	41.1
1.08	12.00	180	180.00	11.	12.	47.	41.1
1.08	13.00	181	181.00	11.	12.	47.	41.1
1.08	14.00	182	182.00	10.	11.	47.	41.1
1.08	15.00	183	183.00	10.	11.	47.	41.1
1.08	16.00	184	184.00	10.	10.	47.	41.1
1.08	17.00	185	185.00	9.	10.	47.	41.1
1.08	18.00	186	186.00	9.	10.	47.	41.1
1.08	19.00	187	187.00	9.	9.	46.	41.1
1.08	20.00	188	188.00	8.	9.	46.	41.1
1.08	21.00	189	189.00	8.	9.	46.	41.1
1.08	22.00	190	190.00	8.	9.	46.	41.1
1.08	23.00	191	191.00	8.	8.	46.	41.1
1.09	0.00	192	192.00	8.	8.	46.	41.1
1.09	1.00	193	193.00	7.	8.	46.	41.1
1.09	2.00	194	194.00	7.	8.	46.	41.1
1.09	3.00	195	195.00	7.	7.	46.	41.1
1.09	4.00	196	196.00	7.	7.	46.	41.1
1.09	5.00	197	197.00	7.	7.	46.	41.1
1.09	6.00	198	198.00	6.	7.	45.	41.1
1.09	7.00	199	199.00	6.	7.	46.	41.1
1.09	8.00	200	200.00	6.	6.	46.	41.1
1.09	9.00	201	201.00	6.	6.	46.	41.1
1.09	10.00	202	202.00	6.	6.	46.	41.1
1.09	11.00	203	203.00	5.	5.	45.	41.1
1.09	12.00	204	204.00	5.	6.	46.	41.1
1.09	13.00	205	205.00	5.	6.	46.	41.1
1.09	14.00	206	206.00	5.	5.	46.	41.1
1.09	15.00	207	207.00	5.	5.	46.	41.1
1.09	16.00	208	208.00	5.	5.	46.	41.1
1.09	17.00	209	209.00	5.	5.	46.	41.1
1.09	18.00	210	210.00	5.	5.	46.	41.1
1.09	19.00	211	211.00	4.	5.	46.	41.1
1.09	20.00	212	212.00	4.	5.	46.	41.0
1.09	21.00	213	213.00	4.	5.	45.	41.0
1.09	22.00	214	214.00	4.	4.	46.	41.0
1.09	23.00	215	215.00	4.	4.	46.	41.0
1.10	0.00	216	215.00	4.	4.	46.	41.0
1.10	1.00	217	217.00	4.	4.	46.	41.0
1.10	2.00	218	218.00	4.	4.	45.	41.0
1.10	3.00	219	219.00	4.	4.	45.	41.0
1.10	4.00	220	220.00	3.	4.	45.	41.0
1.10	5.00	221	221.00	3.	4.	45.	41.0
1.10	6.00	222	222.00	3.	3.	45.	41.0
1.10	7.00	223	223.00	3.	3.	45.	41.0
1.10	8.00	224	224.00	3.	3.	45.	41.0
1.10	9.00	225	225.00	3.	3.	45.	41.0
1.10	10.00	226	226.00	3.	3.	45.	41.0
1.10	11.00	227	227.00	3.	3.	45.	41.0
1.10	12.00	228	228.00	3.	3.	45.	41.0
1.10	13.00	229	229.00	3.	3.	45.	41.0
1.10	14.00	230	230.00	3.	3.	45.	41.0
1.10	15.00	231	231.00	3.	3.	45.	41.0
1.10	16.00	232	232.00	2.	3.	45.	41.0
1.10	17.00	233	233.00	2.	3.	45.	41.0
1.10	18.00	234	234.00	2.	2.	45.	41.0
1.10	19.00	235	235.00	2.	2.	45.	41.0
1.10	20.00	236	236.00	2.	2.	45.	41.0
1.10	21.00	237	237.00	2.	2.	45.	41.0
1.10	22.00	238	238.00	2.	2.	45.	41.0
1.10	23.00	239	239.00	2.	2.	45.	41.0
1.11	0.00	240	240.00	2.	2.	45.	41.0
1.11	1.00	241	241.00	2.	2.	45.	41.0
1.11	2.00	242	242.00	2.	2.	45.	41.0
1.11	3.00	243	243.00	2.	2.	45.	41.0

1.11	5.00	245	245.00	2.	2.	45.	41.0
1.11	6.00	246	246.00	2.	2.	45.	41.0
1.11	7.00	247	247.00	2.	2.	45.	41.0
1.11	8.00	248	248.00	2.	2.	45.	41.0
1.11	9.00	249	249.00	2.	2.	45.	41.0
1.11	10.00	250	250.00	2.	2.	45.	41.0
1.11	11.00	251	251.00	2.	2.	45.	41.0
1.11	12.00	252	252.00	2.	2.	45.	41.0
1.11	13.00	253	253.00	2.	2.	45.	41.0
1.11	14.00	254	254.00	2.	2.	45.	41.0
1.11	15.00	255	255.00	2.	2.	45.	41.0
1.11	16.00	256	256.00	2.	2.	45.	41.0
1.11	17.00	257	257.00	2.	2.	45.	41.0
1.11	18.00	258	258.00	2.	2.	45.	41.0
1.11	19.00	259	259.00	2.	2.	45.	41.0
1.11	20.00	260	260.00	2.	2.	45.	41.0
1.11	21.00	261	261.00	2.	2.	45.	41.0
1.11	22.00	262	262.00	2.	2.	45.	41.0
1.11	23.00	263	263.00	2.	2.	45.	41.0
1.12	0.00	264	264.00	2.	2.	45.	41.0
1.12	1.00	265	265.00	2.	2.	45.	41.0
1.12	2.00	266	266.00	2.	2.	45.	41.0
1.12	3.00	267	267.00	2.	2.	45.	41.0
1.12	4.00	268	268.00	2.	2.	45.	41.0
1.12	5.00	269	269.00	2.	2.	45.	41.0
1.12	6.00	270	270.00	2.	2.	45.	41.0
1.12	7.00	271	271.00	2.	2.	45.	41.0
1.12	8.00	272	272.00	2.	2.	45.	41.0
1.12	9.00	273	273.00	2.	2.	45.	41.0
1.12	10.00	274	274.00	2.	2.	45.	41.0
1.12	11.00	275	275.00	2.	2.	45.	41.0
1.12	12.00	276	276.00	2.	2.	45.	41.0
1.12	13.00	277	277.00	2.	2.	45.	41.0
1.12	14.00	278	278.00	2.	2.	45.	41.0
1.12	15.00	279	279.00	2.	2.	45.	41.0
1.12	16.00	280	280.00	2.	2.	45.	41.0
1.12	17.00	281	281.00	2.	2.	45.	41.0
1.12	18.00	282	282.00	2.	2.	45.	41.0
1.12	19.00	283	283.00	2.	2.	45.	41.0
1.12	20.00	284	284.00	2.	2.	45.	41.0
1.12	21.00	285	285.00	2.	2.	45.	41.0
1.12	22.00	286	286.00	2.	2.	45.	41.0
1.12	23.00	287	287.00	2.	2.	45.	41.0
1.13	0.00	288	288.00	2.	2.	45.	41.0
1.13	1.00	289	289.00	2.	2.	45.	41.0
1.13	2.00	290	290.00	2.	2.	45.	41.0
1.13	3.00	291	291.00	2.	2.	45.	41.0
1.13	4.00	292	292.00	2.	2.	45.	41.0
1.13	5.00	293	293.00	2.	2.	45.	41.0
1.13	6.00	294	294.00	2.	2.	45.	41.0
1.13	7.00	295	295.00	2.	2.	45.	41.0
1.13	8.00	296	296.00	2.	2.	45.	41.0
1.13	9.00	297	297.00	2.	2.	45.	41.0
1.13	10.00	298	298.00	2.	2.	45.	41.0
1.13	11.00	299	299.00	2.	2.	45.	41.0
1.13	12.00	300	300.00	2.	2.	45.	41.0

PEAK OUTFLOW IS 2750. AT TIME 28.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2750.	2584.	2048.	1102.	84333.
CMS	78.	73.	58.	31.	2530.
INCHES		1.85	5.86	9.46	10.65
MM		47.05	148.92	240.38	270.61
AC-FT		1284.	4063.	6558.	7383.
THOUS CU M		1583.	5012.	8089.	9107.

BREAKNECK DAM

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	51.00	51.00	55.80
STORAGE	122.	122.	354.
OUTFLOW	2.	2.	1298.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	57.38	1.58	451.	2772.	25.00	27.00	0.00

LAKE PINE DAM

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	41.00	41.00	46.90
STORAGE	45.	45.	193.
OUTFLOW	0.	0.	1544.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	48.84	1.94	267.	2750.	19.00	28.00	0.00

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A1                           DAM SAFETY ANALYSIS NEW JERSEY
A2                        CENTENNIAL LAKE DAM/BREAKNECK DAM
A3                                    PMF ROUTING
B      300       1       0                               0       0       3
B1       5
J        1       1       1
J1    0.50
K        0    TAUN                       0       0       1
K1                   SUBAREA INFLOW HYDROGRAPH FOR TAUNTON LAKE
M        1       0     5.7             5.7       0
P        0      27     100     109     117
T                                                      1.5    0.15
V     4.36   13.64       0
X     -1.0   -0.05     2.0
K        0    CENT                       0       0       1
K1                 SUBAREA INFLOW HYDROGRAPH FOR CENTENNIAL LAKE
M        1       0     7.3             7.3       0                       1
P        0      27     100     109     117
T                                                      1.5    0.15
V      8.7    27.7       0
X     -1.0   -0.05     2.0
K        1    TAUN                       0       0       1
K1                  ROUTED DISCHARGE THROUGH CENTENNIAL LAKE DAM
Y                                1       1
Y1       1                                           -59.6      -1
Y4    59.6    60.0    60.5    61.0    61.5    62.0    62.5    63.0    63.5    64.0
Y4    64.5    65.0    65.5    66.0    67.0    68.0    69.0    70.0
Y5       0       9      30      58      93     132     176     202     222     241
Y5     256     270     307     428     451     475     496     517
$S       0     334     358    1244
$E    47.9    59.6      60      70
$$    59.6
$D      66    2.63     1.5     300
K        2    TAUN                       0       0       1
K1                      COMBINE HYDROGRAPHS IN TAUNTON LAKE
K        1    BKNK                       0       0       1
K1                    ROUTE HYDROGRAPH THROUGH BREAKNECK DAM
Y                                1       1
Y1       1                                           -51.0      -1
Y4      51      52      53      54      55      56      57      58      59      60
Y4      62      64
Y5       2     170     530     927    1250    1310    1398    1500    1580    1635
Y5    1775    1880
$A       0      39      78
$E    41.6      51      60
$$    51.0
$D    55.8    2.63     1.5     255
$B      50     2.0    46.0       1    51.0    55.8
K        1    LKPN                       0       0       1
K1                    ROUTE HYDROGRAPH THROUGH LAKE PINE DAM
Y                                1       1
Y1       1                                           -41.0      -1
Y4    41.0    42.0    43.0    44.0    45.0    46.0    46.9    48.0    54.0
Y5       0      93     305     644    1022    1448    1544    1697    2094
$A       0      17      46
$E    33.1      41      50
$$    41.0
$D    46.9    2.63     1.5     140
K       99
A
A
A
A
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                       MM           42.19     150.61     227.25          268.07
                    AC-FT            646.      2001.      3481.           4107.
               THOUS CU M            797.      2468.      4294.           5066.

         **********     **********     **********     **********     **********

                                   COMBINE HYDROGRAPHS

                            COMBINE HYDROGRAPHS IN TAUNTON LAKE
                   ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                    TAUN       2       0       0       0       0       1       0       0

                   SUM OF 2 HYDROGRAPHS AT     TAUN   PLAN 1  RTIO 1

                              PEAK   6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                      CFS    2799.    2611.     2100.     1107.         89243.
                      CMS      79.      74.       59.       31.          2527.
                   INCHES              1.87      6.01      9.51          10.64
                       MM             47.46    152.70    241.53         270.34
                    AC-FT             1295.     4166.     6590.          7375.
               THOUS CU M             1597.     5139.     8128.          9097.

         **********     **********     **********     **********     **********

                                   HYDROGRAPH ROUTING

                         ROUTE HYDROGRAPH THROUGH BREAKNECK DAM
                   ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                    BKNK       1       0       0       0       0       1       0       0
                                        ROUTING DATA
           QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
             0.0   0.000    0.00       1       1       0       0               0

                   NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                       1       0       0   0.000   0.000   0.000    -51.      -1

   STAGE      51.00      52.00      53.00      54.00      55.00      56.00      57.00      58.00      59.00      60.00
              62.00      64.00

    FLOW       2.00     170.00     530.00     927.00    1250.00    1310.00    1398.00    1500.00    1580.00    1635.00
            1775.00    1880.00

 SURFACE AREA=       0.      39.      78.
     CAPACITY=       0.     122.     639.
    ELEVATION=      42.      51.      60.

                CREL   SPWID    COQW    EXPW   ELEVL    COQL   CAREA    EXPL
                51.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                                          DAM DATA
                               TOPEL    COQD    EXPD  DAMWID
                                55.8     2.6     1.5    255.

                                      DAM BREACH DATA
                       BRWID       Z    ELBM   TFAIL    WSEL  FAILEL
                         50.    2.00   46.00    1.00   51.00   55.80
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STATION BKNK, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	3.	2.	122.	51.0
1.01	2.00	2	2.00	3.	2.	122.	51.0
1.01	3.00	3	3.00	3.	2.	122.	51.0
1.01	4.00	4	4.00	3.	2.	122.	51.0
1.01	5.00	5	5.00	2.	2.	122.	51.0
1.01	6.00	6	6.00	2.	2.	122.	51.0
1.01	7.00	7	7.00	2.	2.	122.	51.0
1.01	8.00	8	8.00	2.	2.	122.	51.0
1.01	9.00	9	9.00	3.	2.	122.	51.0
1.01	10.00	10	10.00	7.	3.	122.	51.0
1.01	11.00	11	11.00	17.	6.	123.	51.0
1.01	12.00	12	12.00	33.	12.	124.	51.1
1.01	13.00	13	13.00	70.	23.	127.	51.1
1.01	14.00	14	14.00	164.	51.	134.	51.3
1.01	15.00	15	15.00	343.	110.	148.	51.6
1.01	16.00	16	16.00	660.	262.	174.	52.3
1.01	17.00	17	17.00	1118.	575.	213.	53.1
1.01	18.00	18	18.00	1624.	968.	263.	54.1
1.01	19.00	19	19.00	2050.	1265.	322.	55.2
1.01	20.00	20	20.00	2284.	1612.	382.	56.3
BEGIN DAM FAILURE AT 20.00 HOURS							
1.01	21.00	21	21.00	2339.	5717.	273.	54.3
1.01	22.00	22	22.00	2274.	2724.	156.	51.8
1.01	23.00	23	23.00	2171.	2255.	134.	51.3
1.02	0.00	24	24.00	2148.	2166.	130.	51.2
1.02	1.00	25	25.00	2457.	2293.	136.	51.4
1.02	2.00	26	26.00	2778.	2596.	151.	51.7
1.02	3.00	27	27.00	2799.	2776.	159.	51.9
1.02	4.00	28	28.00	2698.	2750.	158.	51.9
1.02	5.00	29	29.00	2568.	2640.	153.	51.8
1.02	6.00	30	30.00	2438.	2512.	147.	51.6
1.02	7.00	31	31.00	2313.	2385.	141.	51.5
1.02	8.00	32	32.00	2195.	2263.	135.	51.3
1.02	9.00	33	33.00	2083.	2147.	129.	51.2
1.02	10.00	34	34.00	1977.	2038.	124.	51.1
1.02	11.00	35	35.00	1878.	1943.	119.	50.9
1.02	12.00	36	36.00	1784.	1851.	114.	50.8
1.02	13.00	37	37.00	1695.	1759.	108.	50.6
1.02	14.00	38	38.00	1611.	1671.	103.	50.5
1.02	15.00	39	39.00	1533.	1588.	98.	50.3
1.02	16.00	40	40.00	1458.	1510.	94.	50.2
1.02	17.00	41	41.00	1388.	1436.	90.	50.1
1.02	18.00	42	42.00	1321.	1366.	86.	50.0
1.02	19.00	43	43.00	1258.	1301.	82.	49.8
1.02	20.00	44	44.00	1199.	1239.	79.	49.7
1.02	21.00	45	45.00	1142.	1180.	76.	49.6
1.02	22.00	46	46.00	1089.	1124.	73.	49.5
1.02	23.00	47	47.00	1039.	1072.	70.	49.4
1.03	0.00	48	48.00	991.	1022.	67.	49.3
1.03	1.00	49	49.00	946.	975.	65.	49.2
1.03	2.00	50	50.00	904.	931.	62.	49.1
1.03	3.00	51	51.00	863.	889.	60.	49.0
1.03	4.00	52	52.00	825.	849.	58.	48.9
1.03	5.00	53	53.00	789.	812.	56.	48.9
1.03	6.00	54	54.00	755.	776.	54.	48.8
1.03	7.00	55	55.00	722.	743.	53.	48.7
1.03	8.00	56	56.00	692.	711.	51.	48.6
1.03	9.00	57	57.00	663.	681.	49.	48.6
1.03	10.00	58	58.00	636.	653.	48.	48.5
1.03	11.00	59	59.00	610.	626.	47.	48.4
1.03	12.00	60	60.00	587.	601.	45.	48.4
1.03	13.00	61	61.00	565.	578.	44.	48.3
1.03	14.00	62	62.00	545.	557.	43.	48.2
1.03	15.00	63	63.00	530.	540.	42.	48.2
1.03	16.00	64	64.00	512.	523.	41.	48.2
1.03	17.00	65	65.00	494.	505.	41.	48.1
1.03	18.00	66	66.00	477.	487.	40.	48.1
1.03	19.00	67	67.00	459.	470.	39.	48.0

1.03	20.00	68	68.00	442.	452.	38.	48.0
1.03	21.00	69	69.00	426.	436.	37.	47.9
1.03	22.00	70	70.00	410.	419.	36.	47.9
1.03	23.00	71	71.00	394.	403.	35.	47.8
1.04	0.00	72	72.00	379.	388.	35.	47.8
1.04	1.00	73	73.00	364.	373.	34.	47.7
1.04	2.00	74	74.00	353.	360.	33.	47.7
1.04	3.00	75	75.00	346.	351.	33.	47.7
1.04	4.00	76	76.00	339.	344.	33.	47.6
1.04	5.00	77	77.00	332.	337.	32.	47.6
1.04	6.00	78	78.00	325.	330.	32.	47.6
1.04	7.00	79	79.00	318.	323.	31.	47.6
1.04	8.00	80	80.00	311.	315.	31.	47.6
1.04	9.00	81	81.00	304.	308.	31.	47.5
1.04	10.00	82	82.00	297.	301.	30.	47.5
1.04	11.00	83	83.00	293.	296.	30.	47.5
1.04	12.00	84	84.00	289.	292.	30.	47.5
1.04	13.00	85	85.00	285.	288.	30.	47.5
1.04	14.00	86	86.00	281.	284.	29.	47.5
1.04	15.00	87	87.00	277.	280.	29.	47.4
1.04	16.00	88	88.00	273.	276.	29.	47.4
1.04	17.00	89	89.00	269.	272.	29.	47.4
1.04	18.00	90	90.00	265.	268.	29.	47.4
1.04	19.00	91	91.00	261.	264.	28.	47.4
1.04	20.00	92	92.00	257.	260.	28.	47.4
1.04	21.00	93	93.00	253.	256.	28.	47.4
1.04	22.00	94	94.00	248.	251.	28.	47.3
1.04	23.00	95	95.00	243.	246.	28.	47.3
1.05	0.00	96	96.00	239.	242.	27.	47.3
1.05	1.00	97	97.00	234.	237.	27.	47.3
1.05	2.00	98	98.00	229.	232.	27.	47.3
1.05	3.00	99	99.00	224.	228.	27.	47.3
1.05	4.00	100	100.00	220.	223.	26.	47.2
1.05	5.00	101	101.00	215.	218.	26.	47.2
1.05	6.00	102	102.00	210.	213.	26.	47.2
1.05	7.00	103	103.00	205.	208.	26.	47.2
1.05	8.00	104	104.00	199.	203.	25.	47.2
1.05	9.00	105	105.00	194.	197.	25.	47.1
1.05	10.00	106	106.00	188.	192.	25.	47.1
1.05	11.00	107	107.00	183.	187.	25.	47.1
1.05	12.00	108	108.00	176.	181.	24.	47.1
1.05	13.00	109	109.00	168.	173.	24.	47.1
1.05	14.00	110	110.00	161.	166.	23.	47.0
1.05	15.00	111	111.00	153.	158.	23.	47.0
1.05	16.00	112	112.00	146.	151.	23.	47.0
1.05	17.00	113	113.00	140.	144.	22.	46.9
1.05	18.00	114	114.00	133.	138.	22.	46.9
1.05	19.00	115	115.00	128.	132.	22.	46.9
1.05	20.00	116	116.00	122.	126.	21.	46.9
1.05	21.00	117	117.00	117.	121.	21.	46.8
1.05	22.00	118	118.00	112.	115.	21.	46.8
1.05	23.00	119	119.00	107.	110.	20.	46.8
1.06	0.00	120	120.00	102.	105.	20.	46.8
1.06	1.00	121	121.00	97.	101.	20.	46.7
1.06	2.00	122	122.00	93.	96.	20.	46.7
1.06	3.00	123	123.00	89.	92.	19.	46.7
1.06	4.00	124	124.00	85.	88.	19.	46.7
1.06	5.00	125	125.00	81.	84.	19.	46.6
1.06	6.00	126	126.00	78.	81.	19.	46.6
1.06	7.00	127	127.00	74.	77.	19.	46.6

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1.06	8.00	128	128.00	71.	74.	18.	46.5
1.06	9.00	129	129.00	68.	70.	18.	46.6
1.06	10.00	130	130.00	65.	67.	18.	46.6
1.06	11.00	131	131.00	62.	64.	18.	46.5
1.06	12.00	132	132.00	59.	61.	18.	46.5
1.06	13.00	133	133.00	57.	59.	17.	46.5
1.06	14.00	134	134.00	54.	56.	17.	46.5
1.06	15.00	135	135.00	52.	54.	17.	46.5
1.06	16.00	136	136.00	50.	52.	17.	46.5
1.06	17.00	137	137.00	48.	50.	17.	46.5
1.06	18.00	138	138.00	46.	48.	17.	46.4
1.06	19.00	139	139.00	45.	46.	17.	46.4
1.06	20.00	140	140.00	43.	44.	16.	46.4
1.06	21.00	141	141.00	41.	43.	16.	46.4
1.06	22.00	142	142.00	39.	41.	16.	46.4
1.06	23.00	143	143.00	38.	39.	16.	46.4
1.07	0.00	144	144.00	36.	38.	16.	46.4
1.07	1.00	145	145.00	35.	36.	16.	46.4
1.07	2.00	146	146.00	33.	35.	16.	46.4
1.07	3.00	147	147.00	32.	33.	16.	46.3
1.07	4.00	148	148.00	30.	32.	16.	46.3
1.07	5.00	149	149.00	29.	31.	15.	46.3
1.07	6.00	150	150.00	28.	29.	15.	46.3
1.07	7.00	151	151.00	28.	28.	15.	46.3
1.07	8.00	152	152.00	27.	28.	15.	46.3
1.07	9.00	153	153.00	26.	27.	15.	46.3
1.07	10.00	154	154.00	25.	26.	15.	46.3
1.07	11.00	155	155.00	24.	25.	15.	46.3
1.07	12.00	156	156.00	23.	24.	15.	46.3
1.07	13.00	157	157.00	22.	23.	15.	46.3
1.07	14.00	158	158.00	22.	23.	15.	46.3
1.07	15.00	159	159.00	21.	22.	15.	46.3
1.07	16.00	160	160.00	20.	21.	15.	46.2
1.07	17.00	161	161.00	20.	20.	15.	46.2
1.07	18.00	162	162.00	19.	20.	15.	46.2
1.07	19.00	163	163.00	18.	19.	15.	46.2
1.07	20.00	164	164.00	18.	18.	15.	46.2
1.07	21.00	165	165.00	17.	18.	14.	46.2
1.07	22.00	166	166.00	16.	17.	14.	46.2
1.07	23.00	167	167.00	16.	16.	14.	46.2
1.08	0.00	168	168.00	15.	16.	14.	46.2
1.08	1.00	169	169.00	15.	15.	14.	46.2
1.08	2.00	170	170.00	14.	15.	14.	46.2
1.08	3.00	171	171.00	14.	14.	14.	46.2
1.08	4.00	172	172.00	13.	14.	14.	46.2
1.08	5.00	173	173.00	13.	13.	14.	46.2
1.08	6.00	174	174.00	12.	13.	14.	46.2
1.08	7.00	175	175.00	12.	12.	14.	46.2
1.08	8.00	176	176.00	11.	12.	14.	46.2
1.08	9.00	177	177.00	11.	12.	14.	46.2
1.08	10.00	178	178.00	11.	11.	14.	46.2
1.08	11.00	179	179.00	10.	11.	14.	46.1
1.08	12.00	180	180.00	10.	10.	14.	46.1
1.08	13.00	181	181.00	9.	10.	14.	46.1
1.08	14.00	182	182.00	9.	10.	14.	46.1
1.08	15.00	183	183.00	9.	9.	14.	46.1
1.08	16.00	184	184.00	9.	9.	14.	46.1
1.08	17.00	185	185.00	8.	9.	14.	46.1
1.08	18.00	186	186.00	8.	9.	14.	46.1
1.08	19.00	187	187.00	8.	8.	14.	46.1
1.08	20.00	188	188.00	8.	8.	14.	46.1
1.08	21.00	189	189.00	8.	8.	14.	46.1
1.08	22.00	190	190.00	7.	8.	14.	46.1
1.08	23.00	191	191.00	7.	7.	13.	46.1
1.09	0.00	192	192.00	7.	7.	13.	46.1
1.09	1.00	193	193.00	7.	7.	13.	46.1
1.09	2.00	194	194.00	7.	7.	13.	46.1
1.09	3.00	195	195.00	6.	7.	13.	46.1
1.09	4.00	196	196.00	6.	7.	13.	46.1
1.09	5.00	197	197.00	6.	6.	13.	46.1
1.09	6.00	198	198.00	6.	6.	13.	46.1
1.09	7.00	199	199.00	6.	6.	13.	46.1
1.09	8.00	200	200.00	6.	6.	13.	46.1
1.09	9.00	201	201.00	5.	6.	13.	46.1

1.09	10.00	202	202.00	5.	6.	13.	46.1
1.09	11.00	203	203.00	5.	5.	13.	46.1
1.09	12.00	204	204.00	5.	5.	13.	46.1
1.09	13.00	205	205.00	5.	5.	13.	46.1
1.09	14.00	206	206.00	5.	5.	13.	46.1
1.09	15.00	207	207.00	5.	5.	13.	46.1
1.09	16.00	208	208.00	4.	5.	13.	46.1
1.09	17.00	209	209.00	4.	5.	13.	46.1
1.09	18.00	210	210.00	4.	4.	13.	46.1
1.09	19.00	211	211.00	4.	4.	13.	46.1
1.09	20.00	212	212.00	4.	4.	13.	46.1
1.09	21.00	213	213.00	4.	4.	13.	46.1
1.09	22.00	214	214.00	4.	4.	13.	46.1
1.09	23.00	215	215.00	4.	4.	13.	46.1
1.10	0.00	216	216.00	4.	4.	13.	46.1
1.10	1.00	217	217.00	3.	4.	13.	46.0
1.10	2.00	218	218.00	3.	4.	13.	46.0
1.10	3.00	219	219.00	3.	4.	13.	46.0
1.10	4.00	220	220.00	3.	3.	13.	46.0
1.10	5.00	221	221.00	3.	3.	13.	46.0
1.10	6.00	222	222.00	3.	3.	13.	46.0
1.10	7.00	223	223.00	3.	3.	13.	46.0
1.10	8.00	224	224.00	3.	3.	13.	46.0
1.10	9.00	225	225.00	3.	3.	13.	46.0
1.10	10.00	226	226.00	3.	3.	13.	46.0
1.10	11.00	227	227.00	3.	3.	13.	46.0
1.10	12.00	228	228.00	3.	3.	13.	46.0
1.10	13.00	229	229.00	2.	3.	13.	46.0
1.10	14.00	230	230.00	2.	3.	13.	46.0
1.10	15.00	231	231.00	2.	3.	13.	46.0
1.10	16.00	232	232.00	2.	2.	13.	46.0
1.10	17.00	233	233.00	2.	2.	13.	46.0
1.10	18.00	234	234.00	2.	2.	13.	46.0
1.10	19.00	235	235.00	2.	2.	13.	46.0
1.10	20.00	236	236.00	2.	2.	13.	46.0
1.10	21.00	237	237.00	2.	2.	13.	46.0
1.10	22.00	238	238.00	2.	2.	13.	46.0
1.10	23.00	239	239.00	2.	2.	13.	46.0
1.11	0.00	240	240.00	2.	2.	13.	46.0
1.11	1.00	241	241.00	2.	2.	13.	46.0
1.11	2.00	242	242.00	2.	2.	13.	46.0
1.11	3.00	243	243.00	2.	2.	13.	46.0
1.11	4.00	244	244.00	2.	2.	13.	46.0
1.11	5.00	245	245.00	2.	2.	12.	46.0
1.11	6.00	246	246.00	2.	2.	12.	46.0
1.11	7.00	247	247.00	1.	2.	12.	46.0
1.11	8.00	248	248.00	1.	2.	12.	46.0
1.11	9.00	249	249.00	1.	2.	12.	46.0
1.11	10.00	250	250.00	1.	2.	12.	46.0
1.11	11.00	251	251.00	1.	2.	12.	46.0
1.11	12.00	252	252.00	1.	2.	12.	46.0
1.11	13.00	253	253.00	1.	2.	12.	46.0
1.11	14.00	254	254.00	1.	2.	12.	46.0
1.11	15.00	255	255.00	1.	2.	12.	45.9
1.11	16.00	256	256.00	1.	2.	12.	45.9
1.11	17.00	257	257.00	1.	2.	12.	45.9
1.11	18.00	258	258.00	1.	2.	12.	45.9
1.11	19.00	259	259.00	1.	2.	12.	45.9
1.11	20.00	260	260.00	1.	2.	12.	45.9
1.11	21.00	261	261.00	1.	2.	12.	45.9
1.11	22.00	262	262.00	1.	2.	12.	45.9
1.11	23.00	263	263.00	1.	2.	12.	45.9
1.12	0.00	264	264.00	1.	2.	11.	45.9
1.12	1.00	265	265.00	1.	2.	11.	45.9
1.12	2.00	266	266.00	1.	2.	11.	45.9
1.12	3.00	267	267.00	1.	2.	11.	45.9
1.12	4.00	268	268.00	1.	2.	11.	45.8
1.12	5.00	269	269.00	1.	2.	11.	45.8
1.12	6.00	270	270.00	1.	2.	11.	45.8
1.12	7.00	271	271.00	1.	2.	11.	45.8
1.12	8.00	272	272.00	1.	2.	11.	45.8
1.12	9.00	273	273.00	1.	2.	11.	45.8
1.12	10.00	274	274.00	1.	2.	11.	45.8
1.12	11.00	275	275.00	1.	2.	11.	45.8

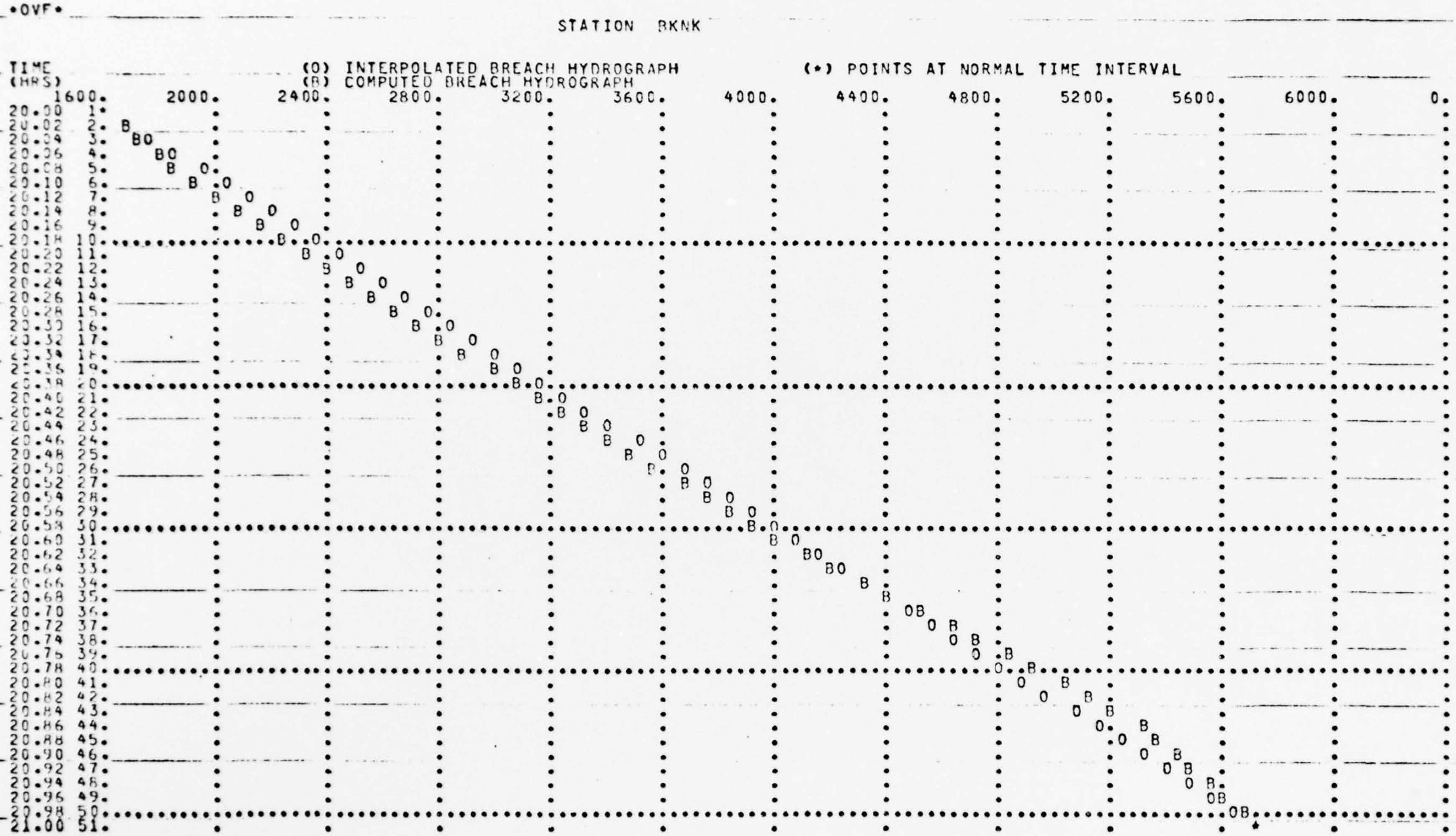
1.12	12.00	276	276.00	1.	2.	11.	45.8
1.12	13.00	277	277.00	1.	2.	10.	45.7
1.12	14.00	278	278.00	1.	2.	10.	45.7
1.12	15.00	279	279.00	1.	2.	10.	45.7
1.12	16.00	280	280.00	1.	2.	10.	45.7
1.12	17.00	281	281.00	1.	2.	10.	45.7
1.12	18.00	282	282.00	1.	2.	10.	45.7
1.12	19.00	283	283.00	1.	2.	10.	45.7
1.12	20.00	284	284.00	0.	2.	10.	45.7
1.12	21.00	285	285.00	0.	2.	10.	45.6
1.12	22.00	286	286.00	0.	2.	10.	45.6
1.12	23.00	287	287.00	0.	2.	9.	45.6
1.13	0.00	288	288.00	0.	2.	9.	45.6
1.13	1.00	289	289.00	0.	2.	9.	45.6
1.13	2.00	290	290.00	0.	2.	9.	45.6
1.13	3.00	291	291.00	0.	2.	9.	45.5
1.13	4.00	292	292.00	0.	2.	9.	45.5
1.13	5.00	293	293.00	0.	2.	9.	45.5
1.13	6.00	294	294.00	0.	2.	9.	45.5
1.13	7.00	295	295.00	0.	2.	9.	45.5
1.13	8.00	296	296.00	0.	2.	8.	45.5
1.13	9.00	297	297.00	0.	2.	8.	45.4
1.13	10.00	298	298.00	0.	2.	8.	45.4
1.13	11.00	299	299.00	0.	2.	8.	45.4
1.13	12.00	300	300.00	0.	2.	8.	45.4

PEAK OUTFLOW IS 5717. AT TIME 21.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5717.	2876.	2220.	1136.	91194.
CMS	162.	81.	63.	32.	2582.
INCHES		2.06	6.35	9.76	10.88
MM		52.28	161.40	247.79	276.25
AC-FT		1426.	4403.	6760.	7537.
THOUS CU M		1759.	5431.	8339.	9296.

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .020 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF 1.000 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
20.000	0.000	1612.		1612.		0.	0.	0.
20.020	.020	1694.		1665.		29.	29.	0.
20.040	.040	1776.		1724.		52.	82.	0.
20.060	.060	1858.		1787.		71.	153.	0.
20.080	.080	1940.		1854.		86.	239.	0.
20.100	.100	2022.		1925.		98.	336.	1.
20.120	.120	2104.		1998.		106.	443.	1.
20.140	.140	2187.		2074.		113.	556.	1.
20.160	.160	2269.		2151.		117.	673.	1.
20.180	.180	2351.		2231.		120.	793.	1.
20.200	.200	2433.		2311.		122.	915.	2.
20.220	.220	2515.		2393.		122.	1037.	2.
20.240	.240	2597.		2476.		122.	1159.	2.
20.260	.260	2679.		2559.		120.	1279.	2.
20.280	.280	2761.		2643.		118.	1397.	2.
20.300	.300	2843.		2727.		116.	1514.	3.
20.320	.320	2926.		2812.		114.	1627.	3.
20.340	.340	3008.		2897.		111.	1738.	3.
20.360	.360	3090.		2982.		108.	1846.	3.
20.380	.380	3172.		3067.		105.	1952.	3.
20.400	.400	3254.		3152.		102.	2054.	3.
20.420	.420	3336.		3237.		99.	2154.	4.
20.440	.440	3418.		3322.		97.	2250.	4.
20.460	.460	3500.		3407.		94.	2344.	4.
20.480	.480	3582.		3492.		91.	2435.	4.
20.500	.500	3665.		3577.		88.	2522.	4.
20.520	.520	3747.		3663.		84.	2606.	4.
20.540	.540	3829.		3748.		80.	2687.	4.
20.560	.560	3911.		3835.		76.	2763.	5.
20.580	.580	3993.		3924.		69.	2832.	5.
20.600	.600	4075.		4015.		61.	2892.	5.
20.620	.620	4157.		4108.		50.	2942.	5.
20.640	.640	4239.		4205.		34.	2976.	5.
20.660	.660	4322.		4311.		11.	2987.	5.
20.680	.680	4404.		4416.		-13.	2974.	5.
20.700	.700	4486.		4520.		-35.	2940.	5.
20.720	.720	4568.		4623.		-56.	2884.	5.
20.740	.740	4650.		4725.		-75.	2809.	5.
20.760	.760	4732.		4825.		-93.	2715.	4.
20.780	.780	4814.		4924.		-110.	2606.	4.
20.800	.800	4896.		5021.		-125.	2481.	4.
20.820	.820	4978.		5116.		-138.	2343.	4.
20.840	.840	5061.		5210.		-149.	2194.	4.
20.860	.860	5143.		5301.		-158.	2035.	3.
20.880	.880	5225.		5373.		-148.	1887.	3.
20.900	.900	5307.		5436.		-129.	1758.	3.
20.920	.920	5389.		5497.		-108.	1651.	3.
20.940	.940	5471.		5555.		-84.	1566.	3.
20.960	.960	5553.		5612.		-59.	1507.	2.
20.980	.980	5635.		5666.		-31.	1477.	2.
21.000	1.000	5717.		5717.		-0.	1477.	2.



•OVF•
STATION BKNK
TIME (HRS)
(O) INTERPOLATED BREACH HYDROGRAPH
(B) COMPUTED BREACH HYDROGRAPH
(•) POINTS AT NORMAL TIME INTERVAL
1600. 2000. 2400. 2800. 3200. 3600. 4000. 4400. 4800. 5200. 5600. 6000. 0.

•OVN•

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HYDROGRAPH ROUTING

ROUTE HYDROGRAPH THROUGH LAKE PINE DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LKPN	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-41.	-1

STAGE	41.00	42.00	43.00	44.00	45.00	46.00	46.90	48.00	54.00
FLOW	0.00	93.00	305.00	644.00	1022.00	1448.00	1544.00	1697.00	2094.00

SURFACE AREA=	0.	17.	46.
CAPACITY=	0.	45.	318.
ELEVATION=	33.	41.	50.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
41.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
46.9	2.6	1.5	140.

STATION LKPN, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	1.00	1	1.00	2.	1.	45.	41.0
1.01	2.00	2	2.00	2.	1.	45.	41.0
1.01	3.00	3	3.00	2.	2.	45.	41.0
1.01	4.00	4	4.00	2.	2.	45.	41.0
1.01	5.00	5	5.00	2.	2.	45.	41.0
1.01	6.00	6	6.00	2.	2.	45.	41.0
1.01	7.00	7	7.00	2.	2.	45.	41.0
1.01	8.00	8	8.00	2.	2.	45.	41.0
1.01	9.00	9	9.00	2.	2.	45.	41.0
1.01	10.00	10	10.00	3.	3.	45.	41.0
1.01	11.00	11	11.00	6.	3.	45.	41.0
1.01	12.00	12	12.00	12.	5.	46.	41.1
1.01	13.00	13	13.00	23.	10.	47.	41.1
1.01	14.00	14	14.00	51.	20.	48.	41.2
1.01	15.00	15	15.00	110.	41.	53.	41.4
1.01	16.00	16	16.00	262.	91.	63.	42.0
1.01	17.00	17	17.00	575.	284.	82.	42.9
1.01	18.00	18	18.00	968.	640.	107.	44.0
1.01	19.00	19	19.00	1265.	993.	132.	44.9
1.01	20.00	20	20.00	1612.	1326.	155.	45.7
1.01	21.00	21	21.00	5717.	2999.	279.	49.1
1.01	22.00	22	22.00	2724.	4165.	332.	50.3
1.01	23.00	23	23.00	2255.	2585.	259.	48.6
1.02	0.00	24	24.00	2166.	2258.	241.	48.2
1.02	1.00	25	25.00	2293.	2234.	240.	48.2
1.02	2.00	26	26.00	2596.	2415.	250.	48.4
1.02	3.00	27	27.00	2776.	2656.	262.	48.7
1.02	4.00	28	28.00	2750.	2753.	267.	48.8
1.02	5.00	29	29.00	2640.	2701.	265.	48.8
1.02	6.00	30	30.00	2512.	2589.	259.	48.6
1.02	7.00	31	31.00	2385.	2464.	252.	48.5
1.02	8.00	32	32.00	2263.	2342.	246.	48.3

1.02	9.00	33	33.00	2147.	2225.	239.	48.2
1.02	10.00	34	34.00	2038.	2115.	233.	48.0
1.02	11.00	35	35.00	1943.	2008.	227.	47.8
1.02	12.00	36	36.00	1851.	1915.	222.	47.7
1.02	13.00	37	37.00	1759.	1826.	216.	47.5
1.02	14.00	38	38.00	1671.	1749.	211.	47.4
1.02	15.00	39	39.00	1588.	1660.	205.	47.2
1.02	16.00	40	40.00	1510.	1588.	199.	47.1
1.02	17.00	41	41.00	1436.	1538.	191.	46.8
1.02	18.00	42	42.00	1366.	1506.	181.	46.5
1.02	19.00	43	43.00	1301.	1465.	169.	46.2
1.02	20.00	44	44.00	1239.	1357.	157.	45.8
1.02	21.00	45	45.00	1180.	1248.	150.	45.5
1.02	22.00	46	46.00	1124.	1176.	145.	45.4
1.02	23.00	47	47.00	1072.	1117.	141.	45.2
1.03	0.00	48	48.00	1022.	1064.	137.	45.1
1.03	1.00	49	49.00	975.	1015.	134.	45.0
1.03	2.00	50	50.00	931.	971.	130.	44.9
1.03	3.00	51	51.00	889.	927.	127.	44.7
1.03	4.00	52	52.00	849.	885.	124.	44.6
1.03	5.00	53	53.00	812.	845.	121.	44.5
1.03	6.00	54	54.00	776.	807.	119.	44.4
1.03	7.00	55	55.00	743.	772.	116.	44.3
1.03	8.00	56	56.00	711.	738.	114.	44.2
1.03	9.00	57	57.00	681.	706.	112.	44.2
1.03	10.00	58	58.00	653.	676.	110.	44.1
1.03	11.00	59	59.00	626.	648.	108.	44.0
1.03	12.00	60	60.00	601.	623.	106.	43.9
1.03	13.00	61	61.00	578.	599.	104.	43.9
1.03	14.00	62	62.00	557.	576.	103.	43.8
1.03	15.00	63	63.00	540.	556.	101.	43.7
1.03	16.00	64	64.00	523.	538.	100.	43.7
1.03	17.00	65	65.00	505.	520.	99.	43.6
1.03	18.00	66	66.00	487.	503.	97.	43.6
1.03	19.00	67	67.00	470.	485.	96.	43.5
1.03	20.00	68	68.00	452.	467.	95.	43.5
1.03	21.00	69	69.00	436.	450.	94.	43.4
1.03	22.00	70	70.00	419.	433.	92.	43.4
1.03	23.00	71	71.00	403.	417.	91.	43.3
1.04	0.00	72	72.00	388.	401.	90.	43.3
1.04	1.00	73	73.00	373.	386.	89.	43.2
1.04	2.00	74	74.00	360.	371.	88.	43.2
1.04	3.00	75	75.00	351.	359.	87.	43.2
1.04	4.00	76	76.00	344.	350.	87.	43.1
1.04	5.00	77	77.00	337.	343.	86.	43.1
1.04	6.00	78	78.00	330.	336.	86.	43.1
1.04	7.00	79	79.00	323.	328.	85.	43.1
1.04	8.00	80	80.00	315.	321.	85.	43.0
1.04	9.00	81	81.00	308.	314.	84.	43.0
1.04	10.00	82	82.00	301.	307.	84.	43.0
1.04	11.00	83	83.00	296.	302.	84.	43.0
1.04	12.00	84	84.00	292.	297.	83.	43.0
1.04	13.00	85	85.00	288.	293.	83.	42.9
1.04	14.00	86	86.00	284.	289.	82.	42.9
1.04	15.00	87	87.00	280.	285.	82.	42.9
1.04	16.00	88	88.00	276.	281.	81.	42.9
1.04	17.00	89	89.00	272.	277.	81.	42.9
1.04	18.00	90	90.00	268.	273.	81.	42.8
1.04	19.00	91	91.00	264.	269.	80.	42.8
1.04	20.00	92	92.00	260.	265.	80.	42.8
1.04	21.00	93	93.00	256.	261.	79.	42.8
1.04	22.00	94	94.00	251.	257.	79.	42.8
1.04	23.00	95	95.00	246.	252.	78.	42.8
1.05	0.00	96	96.00	242.	248.	78.	42.7

1.05	1.00	97	97.00	237.	243.	77.	42.7
1.05	2.00	98	98.00	232.	238.	77.	42.7
1.05	3.00	99	99.00	228.	233.	77.	42.7
1.05	4.00	100	100.00	223.	229.	76.	42.6
1.05	5.00	101	101.00	218.	224.	76.	42.6
1.05	6.00	102	102.00	213.	219.	75.	42.6
1.05	7.00	103	103.00	208.	214.	75.	42.6
1.05	8.00	104	104.00	203.	209.	74.	42.5
1.05	9.00	105	105.00	197.	204.	74.	42.5
1.05	10.00	106	106.00	192.	199.	73.	42.5
1.05	11.00	107	107.00	187.	193.	73.	42.5
1.05	12.00	108	108.00	181.	188.	72.	42.4
1.05	13.00	109	109.00	173.	181.	71.	42.4
1.05	14.00	110	110.00	166.	174.	71.	42.4
1.05	15.00	111	111.00	158.	167.	70.	42.3
1.05	16.00	112	112.00	151.	160.	69.	42.3
1.05	17.00	113	113.00	144.	152.	69.	42.3
1.05	18.00	114	114.00	138.	146.	68.	42.2
1.05	19.00	115	115.00	132.	139.	67.	42.2
1.05	20.00	116	116.00	126.	133.	67.	42.2
1.05	21.00	117	117.00	121.	127.	66.	42.2
1.05	22.00	118	118.00	115.	122.	66.	42.1
1.05	23.00	119	119.00	110.	116.	65.	42.1
1.06	0.00	120	120.00	105.	111.	65.	42.1
1.06	1.00	121	121.00	101.	106.	64.	42.1
1.06	2.00	122	122.00	96.	101.	64.	42.0
1.06	3.00	123	123.00	92.	97.	63.	42.0
1.06	4.00	124	124.00	88.	93.	63.	42.0
1.06	5.00	125	125.00	84.	91.	63.	42.0
1.06	6.00	126	126.00	81.	88.	62.	41.9
1.06	7.00	127	127.00	77.	85.	61.	41.9
1.06	8.00	128	128.00	74.	82.	61.	41.9
1.06	9.00	129	129.00	70.	79.	60.	41.8
1.06	10.00	130	130.00	67.	75.	59.	41.8
1.06	11.00	131	131.00	64.	72.	59.	41.8
1.06	12.00	132	132.00	61.	69.	58.	41.7
1.06	13.00	133	133.00	59.	66.	57.	41.7
1.06	14.00	134	134.00	56.	63.	57.	41.7
1.06	15.00	135	135.00	54.	61.	56.	41.7
1.06	16.00	136	136.00	52.	58.	56.	41.6
1.06	17.00	137	137.00	50.	56.	55.	41.6
1.06	18.00	138	138.00	48.	53.	55.	41.6
1.06	19.00	139	139.00	46.	51.	55.	41.6
1.06	20.00	140	140.00	44.	49.	54.	41.5
1.06	21.00	141	141.00	43.	47.	54.	41.5
1.06	22.00	142	142.00	41.	45.	53.	41.5
1.06	23.00	143	143.00	39.	44.	53.	41.5
1.07	0.00	144	144.00	38.	42.	53.	41.4
1.07	1.00	145	145.00	36.	40.	52.	41.4
1.07	2.00	146	146.00	35.	38.	52.	41.4
1.07	3.00	147	147.00	33.	37.	52.	41.4
1.07	4.00	148	148.00	32.	35.	51.	41.4
1.07	5.00	149	149.00	31.	34.	51.	41.4
1.07	6.00	150	150.00	29.	33.	51.	41.3
1.07	7.00	151	151.00	28.	31.	51.	41.3
1.07	8.00	152	152.00	28.	30.	50.	41.3
1.07	9.00	153	153.00	27.	29.	50.	41.3
1.07	10.00	154	154.00	26.	28.	50.	41.3
1.07	11.00	155	155.00	25.	27.	50.	41.3
1.07	12.00	156	156.00	24.	26.	50.	41.3
1.07	13.00	157	157.00	23.	25.	49.	41.3
1.07	14.00	158	158.00	23.	24.	49.	41.3
1.07	15.00	159	159.00	22.	24.	49.	41.3
1.07	16.00	160	160.00	21.	23.	49.	41.2

1.07	17.00	161	161.00	20.	22.	49.	41.2
1.07	18.00	162	162.00	20.	21.	49.	41.2
1.07	19.00	163	163.00	19.	21.	49.	41.2
1.07	20.00	164	164.00	18.	20.	48.	41.2
1.07	21.00	165	165.00	18.	19.	48.	41.2
1.07	22.00	166	166.00	17.	19.	48.	41.2
1.07	23.00	167	167.00	16.	18.	48.	41.2
1.08	0.00	168	168.00	16.	17.	48.	41.2
1.08	1.00	169	169.00	15.	17.	48.	41.2
1.08	2.00	170	170.00	15.	16.	48.	41.2
1.08	3.00	171	171.00	14.	16.	48.	41.2
1.08	4.00	172	172.00	14.	15.	48.	41.2
1.08	5.00	173	173.00	13.	15.	47.	41.2
1.08	6.00	174	174.00	13.	14.	47.	41.2
1.08	7.00	175	175.00	12.	14.	47.	41.1
1.08	8.00	176	176.00	12.	13.	47.	41.1
1.08	9.00	177	177.00	12.	13.	47.	41.1
1.08	10.00	178	178.00	11.	12.	47.	41.1
1.08	11.00	179	179.00	11.	12.	47.	41.1
1.08	12.00	180	180.00	10.	11.	47.	41.1
1.08	13.00	181	181.00	10.	11.	47.	41.1
1.08	14.00	182	182.00	10.	11.	47.	41.1
1.08	15.00	183	183.00	9.	10.	47.	41.1
1.08	16.00	184	184.00	9.	10.	47.	41.1
1.08	17.00	185	185.00	9.	9.	47.	41.1
1.08	18.00	186	186.00	9.	9.	46.	41.1
1.08	19.00	187	187.00	8.	9.	46.	41.1
1.08	20.00	188	188.00	8.	9.	46.	41.1
1.08	21.00	189	189.00	8.	8.	46.	41.1
1.08	22.00	190	190.00	8.	8.	46.	41.1
1.08	23.00	191	191.00	7.	8.	46.	41.1
1.09	0.00	192	192.00	7.	8.	46.	41.1
1.09	1.00	193	193.00	7.	8.	46.	41.1
1.09	2.00	194	194.00	7.	7.	46.	41.1
1.09	3.00	195	195.00	7.	7.	46.	41.1
1.09	4.00	196	196.00	7.	7.	46.	41.1
1.09	5.00	197	197.00	6.	7.	46.	41.1
1.09	6.00	198	198.00	6.	7.	46.	41.1
1.09	7.00	199	199.00	6.	6.	46.	41.1
1.09	8.00	200	200.00	6.	6.	46.	41.1
1.09	9.00	201	201.00	6.	6.	46.	41.1
1.09	10.00	202	202.00	6.	6.	46.	41.1
1.09	11.00	203	203.00	5.	6.	46.	41.1
1.09	12.00	204	204.00	5.	6.	46.	41.1
1.09	13.00	205	205.00	5.	5.	46.	41.1
1.09	14.00	206	206.00	5.	5.	46.	41.1
1.09	15.00	207	207.00	5.	5.	46.	41.1
1.09	16.00	208	208.00	5.	5.	46.	41.1
1.09	17.00	209	209.00	5.	5.	46.	41.1
1.09	18.00	210	210.00	4.	5.	46.	41.1
1.09	19.00	211	211.00	4.	5.	46.	41.1
1.09	20.00	212	212.00	4.	5.	46.	41.0
1.09	21.00	213	213.00	4.	4.	46.	41.0
1.09	22.00	214	214.00	4.	4.	46.	41.0
1.09	23.00	215	215.00	4.	4.	46.	41.0
1.10	0.00	216	216.00	4.	4.	46.	41.0
1.10	1.00	217	217.00	4.	4.	45.	41.0
1.10	2.00	218	218.00	4.	4.	45.	41.0
1.10	3.00	219	219.00	4.	4.	45.	41.0
1.10	4.00	220	220.00	3.	4.	45.	41.0
1.10	5.00	221	221.00	3.	4.	45.	41.0
1.10	6.00	222	222.00	3.	3.	45.	41.0
1.10	7.00	223	223.00	3.	3.	45.	41.0
1.10	8.00	224	224.00	3.	3.	45.	41.0
1.10	9.00	225	225.00	3.	3.	45.	41.0
1.10	10.00	226	226.00	3.	3.	45.	41.0
1.10	11.00	227	227.00	3.	3.	45.	41.0
1.10	12.00	228	228.00	3.	3.	45.	41.0
1.10	13.00	229	229.00	3.	3.	45.	41.0
1.10	14.00	230	230.00	3.	3.	45.	41.0
1.10	15.00	231	231.00	3.	3.	45.	41.0
1.10	16.00	232	232.00	3.	3.	45.	41.0
1.10	17.00	233	233.00	2.	3.	45.	41.0
1.10	18.00	234	234.00	2.	3.	45.	41.0
1.10	19.00	235	235.00	2.	2.	45.	41.0
1.10	20.00	236	236.00	[illegible]	[illegible]	[illegible]	[illegible]

1.10	21.00	237	237.00	2.	2.	45.	41.0
1.10	22.00	238	238.00	2.	2.	45.	41.0
1.10	23.00	239	239.00	2.	2.	45.	41.0
1.11	0.00	240	240.00	2.	2.	45.	41.0
1.11	1.00	241	241.00	2.	2.	45.	41.0
1.11	2.00	242	242.00	2.	2.	45.	41.0
1.11	3.00	243	243.00	2.	2.	45.	41.0
1.11	4.00	244	244.00	2.	2.	45.	41.0
1.11	5.00	245	245.00	2.	2.	45.	41.0
1.11	6.00	246	246.00	2.	2.	45.	41.0
1.11	7.00	247	247.00	2.	2.	45.	41.0
1.11	8.00	248	248.00	2.	2.	45.	41.0
1.11	9.00	249	249.00	2.	2.	45.	41.0
1.11	10.00	250	250.00	2.	2.	45.	41.0
1.11	11.00	251	251.00	2.	2.	45.	41.0
1.11	12.00	252	252.00	2.	2.	45.	41.0
1.11	13.00	253	253.00	2.	2.	45.	41.0
1.11	14.00	254	254.00	2.	2.	45.	41.0
1.11	15.00	255	255.00	2.	2.	45.	41.0
1.11	16.00	256	256.00	2.	2.	45.	41.0
1.11	17.00	257	257.00	2.	2.	45.	41.0
1.11	18.00	258	258.00	2.	2.	45.	41.0
1.11	19.00	259	259.00	2.	2.	45.	41.0
1.11	20.00	260	260.00	2.	2.	45.	41.0
1.11	21.00	261	261.00	2.	2.	45.	41.0
1.11	22.00	262	262.00	2.	2.	45.	41.0
1.11	23.00	263	263.00	2.	2.	45.	41.0
1.12	0.00	264	264.00	2.	2.	45.	41.0
1.12	1.00	265	265.00	2.	2.	45.	41.0
1.12	2.00	266	266.00	2.	2.	45.	41.0
1.12	3.00	267	267.00	2.	2.	45.	41.0
1.12	4.00	268	268.00	2.	2.	45.	41.0
1.12	5.00	269	269.00	2.	2.	45.	41.0
1.12	6.00	270	270.00	2.	2.	45.	41.0
1.12	7.00	271	271.00	2.	2.	45.	41.0
1.12	8.00	272	272.00	2.	2.	45.	41.0
1.12	9.00	273	273.00	2.	2.	45.	41.0
1.12	10.00	274	274.00	2.	2.	45.	41.0
1.12	11.00	275	275.00	2.	2.	45.	41.0
1.12	12.00	276	276.00	2.	2.	45.	41.0
1.12	13.00	277	277.00	2.	2.	45.	41.0
1.12	14.00	278	278.00	2.	2.	45.	41.0
1.12	15.00	279	279.00	2.	2.	45.	41.0
1.12	16.00	280	280.00	2.	2.	45.	41.0
1.12	17.00	281	281.00	2.	2.	45.	41.0
1.12	18.00	282	282.00	2.	2.	45.	41.0
1.12	19.00	283	283.00	2.	2.	45.	41.0
1.12	20.00	284	284.00	2.	2.	45.	41.0
1.12	21.00	285	285.00	2.	2.	45.	41.0
1.12	22.00	286	286.00	2.	2.	45.	41.0
1.12	23.00	287	287.00	2.	2.	45.	41.0
1.13	0.00	288	288.00	2.	2.	45.	41.0
1.13	1.00	289	289.00	2.	2.	45.	41.0
1.13	2.00	290	290.00	2.	2.	45.	41.0
1.13	3.00	291	291.00	2.	2.	45.	41.0
1.13	4.00	292	292.00	2.	2.	45.	41.0
1.13	5.00	293	293.00	2.	2.	45.	41.0
1.13	6.00	294	294.00	2.	2.	45.	41.0
1.13	7.00	295	295.00	2.	2.	45.	41.0
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1.13	9.00	297	297.00	2.	2.	45.	41.0
1.13	10.00	298	298.00	2.	2.	45.	41.0
1.13	11.00	299	299.00	2.	2.	45.	41.0
1.13	12.00	300	300.00	2.	2.	45.	41.0

PEAK OUTFLOW IS 4165. AT TIME 22.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4165.	2747.	2212.	1134.	91204.
CMS	118.	78.	63.	32.	2583.
INCHES		1.97	6.33	9.74	10.88
MM		49.93	160.81	247.39	276.28
AC-FT		1362.	4387.	6749.	7537.
THOUS CU M		1680.	5412.	8325.	9297.

BREAKNECK DAM

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	51.00	51.00	55.80
STORAGE	122.	122.	354.
OUTFLOW	2.	2.	1298.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	56.38	.58	388.	5717.	1.64	21.00	20.00

LAKE PINE DAM

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	41.00	41.00	46.90
STORAGE	45.	45.	193.
OUTFLOW	0.	0.	1544.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	50.31	3.41	332.	4165.	20.00	22.00	0.00

```
A1              DAM SAFETY ANALYSIS NEW JERSEY
A2           CENTENNIAL LAKE DAM/BREAKNECK DAM
A3                        PMF ROUTING
B      300       1       0                               0       0       3
B1       5
J        1       5       1
J1    0.10    0.20    0.30    0.40    0.50
K        0    TAUN                       0       0       1
K1              SUBAREA INFLOW HYDROGRAPH FOR TAUNTON LAKE
M        1       0     5.7             5.7       0
P        0      27     100     109     117
T                                                      1.5    0.15
V     4.36   13.64       0
X     -1.0   -0.05     2.0
K        0    CENT                       0       0       1
K1              SUBAREA INFLOW HYDROGRAPH FOR CENTENNIAL LAKE
M        1       0     7.3             7.3       0                       1
P        0      27     100     109     117
T                                                      1.5    0.15
V      8.7    27.7       0
X     -1.0   -0.05     2.0
K        1    TAUN                       0       0       1
K1              ROUTED DISCHARGE THROUGH CENTENNIAL LAKE DAM
Y                                1       1
Y1       1                                           -59.6      -1
Y4    59.6    60.0    60.5    61.0    61.5    62.0    62.5    63.0    63.5    64.0
Y4    64.5    65.0    65.5    66.0    67.0    68.0    69.0    70.0
Y5       0       9      30      58      93     132     176     202     222     241
Y5     256     270     307     428     451     475     496     517
$S       0     334     358    1244
$E    47.9    59.6      60      70
$$    59.6
$D      66    2.63     1.5     300
K        2    TAUN                       0       0       1
K1                  COMBINE HYDROGRAPHS IN TAUNTON LAKE
K        1    BKNK                       0       0       1
K1               ROUTE HYDROGRAPH THROUGH BREAKNECK DAM
Y                                1       1
Y1       1                                           -51.0      -1
Y4      51      52      53      54      55      56      57      58      59      60
Y4      62      64
Y5       2     170     530     927    1250    1310    1398    1500    1580    1635
Y5    1775    1880
$A       0      39      78
$E    41.6      51      60
$$    51.0
$D    55.8    2.63     1.5     255
K       99
A
A
A
A
A
```

CENTENNIAL LAKE DAM

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	59.60	59.60	66.00
STORAGE	334.	334.	890.
OUTFLOW	0.	0.	426.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	62.46	0.00	576.	173.	0.00	40.00	0.00
.20	65.52	0.00	847.	313.	0.00	43.00	0.00
.30	66.45	.45	930.	680.	19.00	33.00	0.00
.40	66.82	.82	962.	1033.	31.00	29.00	0.00
.50	67.10	1.10	987.	1367.	38.00	27.00	0.00

BREAKNECK DAM

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	51.00	51.00	55.80
STORAGE	122.	122.	354.
OUTFLOW	2.	2.	1298.

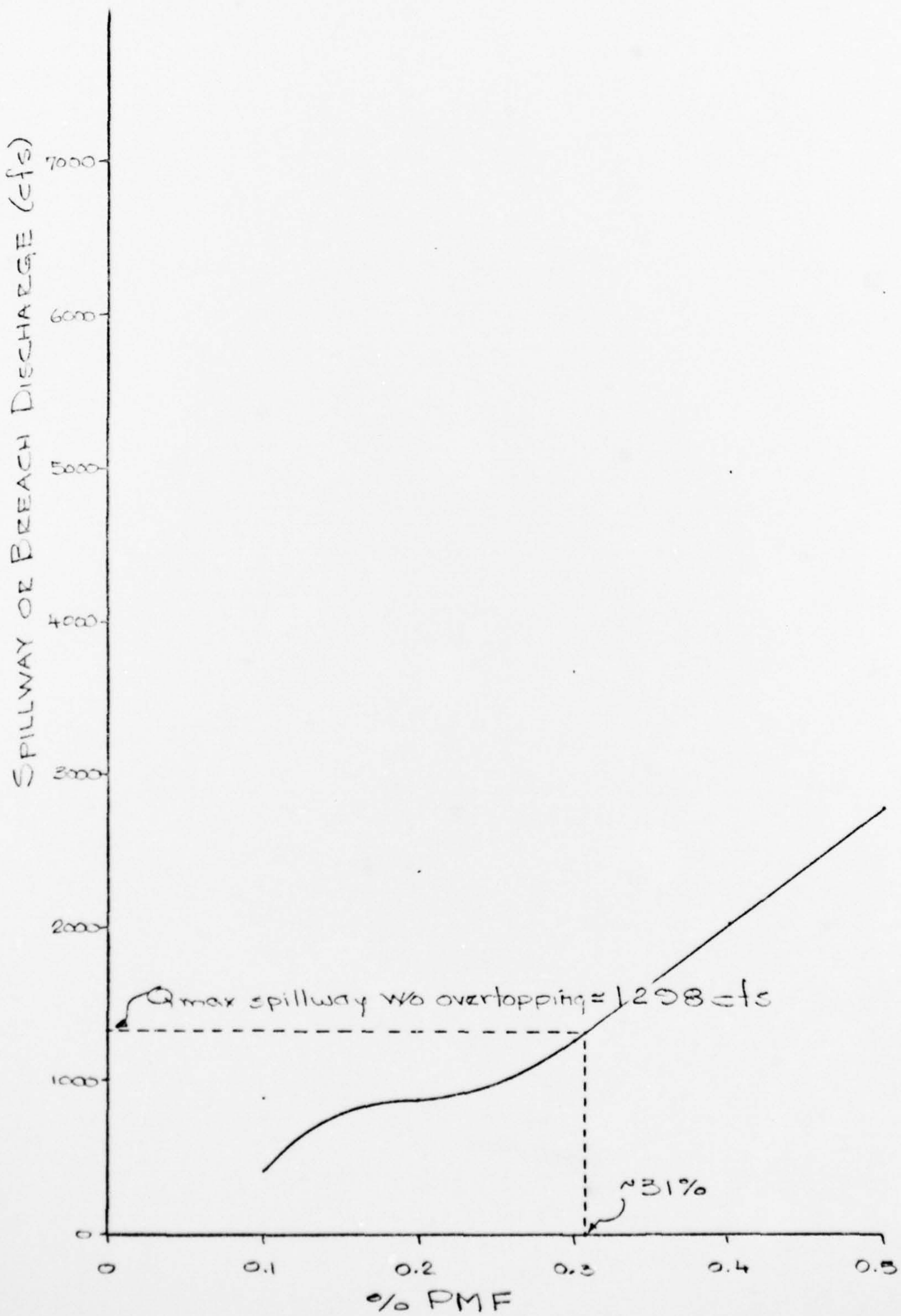
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	52.71	0.00	194.	426.	0.00	23.00	0.00
.20	53.86	0.00	249.	873.	0.00	23.00	0.00
.30	55.23	0.00	321.	1264.	0.00	24.00	0.00
.40	56.77	.97	413.	2024.	19.00	29.00	0.00
.50	57.38	1.58	451.	2772.	25.00	27.00	0.00

STORCH ENGINEERS

Sheet_____ of _____

Project BREAKNECK DAM   #1132   Made By EAW   Date APR 19, 1979

% PMF PASSED THROUGH SPILLWAY   Chkd By_____   Date _____

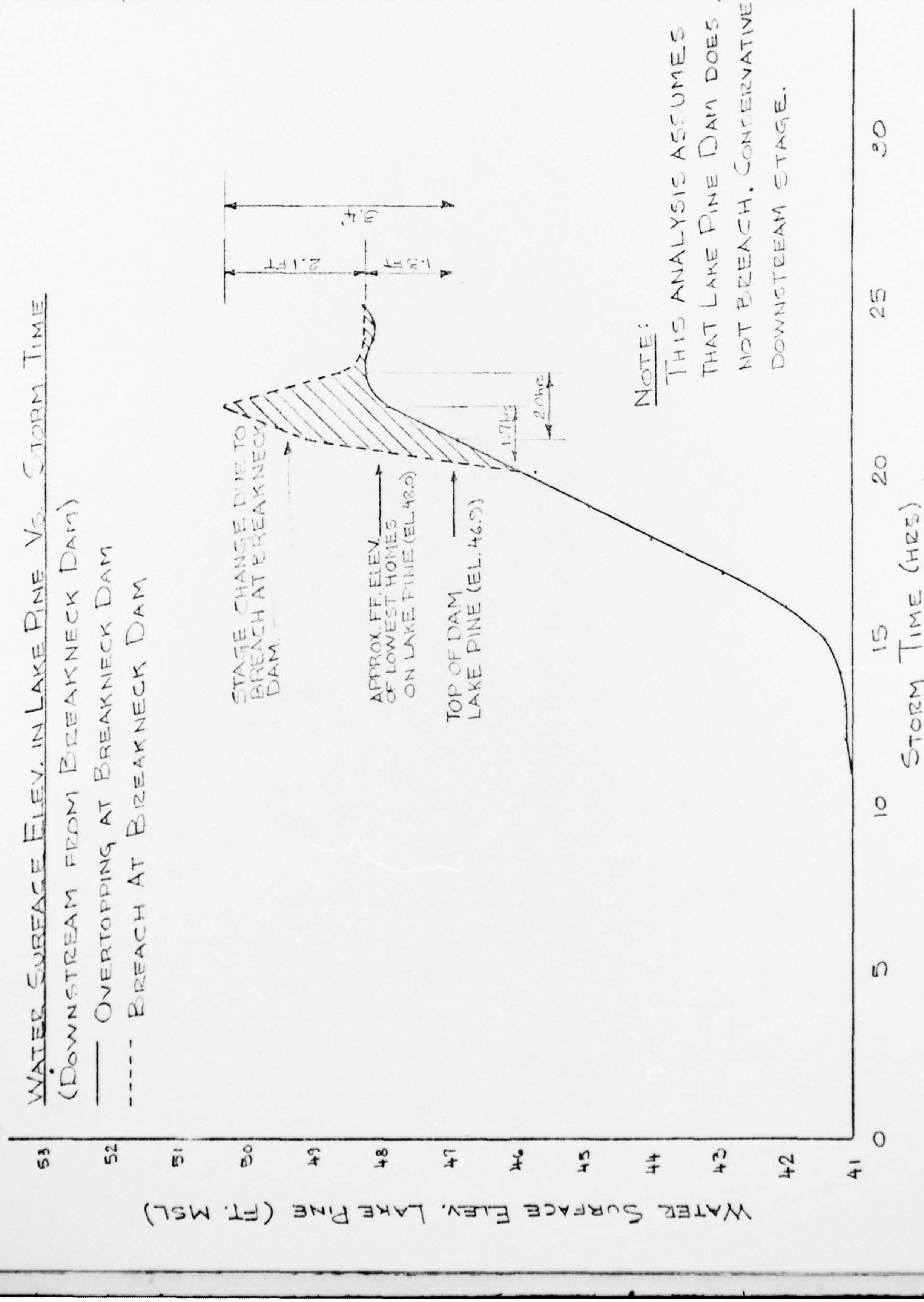


STORCH ENGINEERS

Sheet ______ of ______

Project BREAKNECK DAM #1132 Made By EAW Date APR. 17, 1979

STAGE VS. TIME (LAKE PINE - DOWNSTREAM) Chkd By ______ Date ______



APPENDIX 5

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11. The following plan, section and detail drawings prepared by Albert C. Jones, PE:

Plan View and Section, Breakneck Dam (no date) Approved February 3, 1941.

Detail and Section Views, Proposed Reinforced Concrete Strut (no date) Approved February 3, 1941.